VOL. 26, NO. 9
ISSN: 1541-9576
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FOOD PROTECTION TRENDS

SCIENCE AND NEWS FROM THE INTERNATIONAL ASSOCIATION FOR FOOD PROTECTION

SEPTEMBER 2006

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Cleaning and Sanitizing Food Contact Surfaces

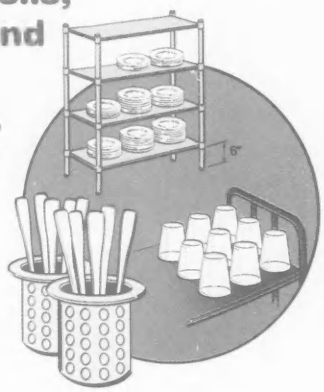
Everything in your operation must be clean; however, any surface that comes in contact with food, such as a cutting board, utensil, or knife must be cleaned and sanitized.

Dishwashing Machine Operation

All dishwashing machines should be operated according to the recommendations provided by the manufacturer.

Storing Utensils, Tableware, and Equipment

Once utensils, tableware, and equipment are clean and sanitary, store them so they stay that way.



Thoroughly Clean Your Establishment

Keeping your establishment thoroughly clean and sanitary will help prevent food from becoming contaminated. It will also keep pests—another source of contamination—out of your establishment.

Proper Garbage Disposal

Dispose of garbage quickly and correctly to avoid attracting pests and contaminating food, equipment, and utensils.

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References:

[1] Rose, Bonnie E. 2001. Isolation and identification of *Salmonella* from meat, poultry and egg products. *In* Microbiology laboratory guidebook, 3rd ed., Food Safety and Inspection Service, U.S. Department of Agriculture, Washington, D.C.

[2] U.S. Food and Drug Administration. 2003. Bacteriological analytical manual (online), AOAC International, Gaithersburg, MD.

[3] International Organization for Standards (ISO). Microbiology of food and animal feeding stuffs – Horizontal method for the detection of *Salmonella* spp., 4th Edition, ISO 6579:2002.

[4] Data on file, Diagnostic Systems, Sparks, MD 21152, USA.

BBL™ CHROMagar™ Family AOAC™-RI Approved	Cat. No.	Unit
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International Association for Food Protection

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VOLUME 26 NO. 9

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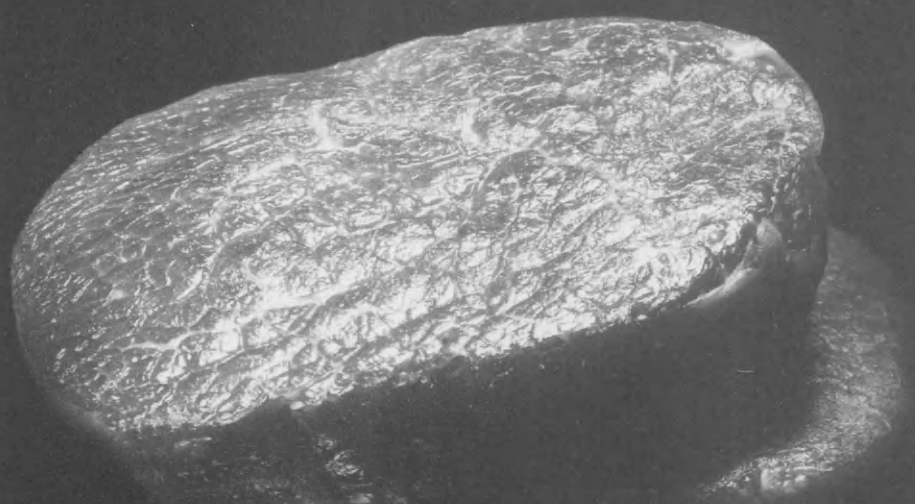

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FOOD PROTECTION TRENDS
SCIENCE AND NEWS
FROM THE INTERNATIONAL ASSOCIATION FOR FOOD PROTECTION

Food Protection Trends (ISSN-1541-9576) is published monthly beginning with the January number by the International Association for Food Protection, 6200 Aurora Avenue, Suite 200W, Des Moines, Iowa 50322-2864, USA. Each volume comprises 12 numbers. Printed by Heuss Printing, Inc., 911 N. Second Street, Ames, Iowa 50010, USA. Periodical Postage paid at Des Moines, Iowa 50318 and additional entry offices.

Manuscripts: Correspondence regarding manuscripts should be addressed to Donna A. Bahun, Production Editor, International Association for Food Protection.

News Releases, Updates, Coming Events and Cover Photos: Correspondence for these materials should be sent to Donna A. Bahun, Production Editor, International Association for Food Protection.

"Instructions for Authors" may be obtained from our Web site at www.foodprotection.org or from Donna A. Bahun, Production Editor, International Association for Food Protection.

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Subscription Rates: ***Food Protection Trends*** is available by subscription for $241.00 US, $256.00 Canada/Mexico, and $271.00 International. Single issues are available for $26.00 US and $35.00 all other countries. All rates include shipping and handling. No cancellations accepted. For more information contact Julie A. Cattanach, Membership Services, International Association for Food Protection.

Claims: Notice of failure to receive copies must be reported within 30 days domestic, 90 days outside US.

Postmaster: Send address changes to ***Food Protection Trends***, 6200 Aurora Avenue, Suite 200W, Des Moines, Iowa 50322-2864, USA.

Food Protection Trends is printed on paper that meets the requirements of ANSI/NISO 239.48-1992.

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FOOD PROTECTION TRENDS

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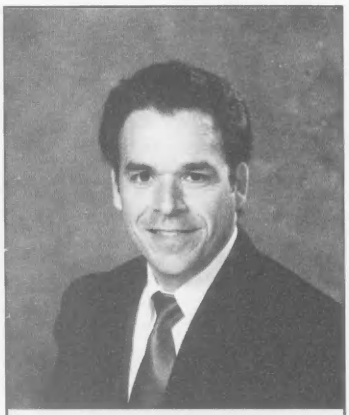


By **FRANK YIANNAS**
PRESIDENT

"Let me summarize three good reasons why IAFP must maintain a strong international focus."

As I write my first column, I'm flying home over the Pacific Ocean after participating in the first meeting of the New Zealand Association for Food Protection, which was held in conjunction with the New Zealand Institute of Food Science & Technology in Auckland. We just passed the International Date Line traveling east, so I have just gone back in time a bit but my thoughts are definitely on the future. A few weeks ago, I also attended the Brazilian Association for Food Protection meeting in São Paulo. My recent participation in a couple of our international affiliate meetings has put me in a reflective mood about our Association, our Association's name (the International Association for Food Protection), and our future.

However, before I jump into my first monthly message, I want to pause for a moment and thank Jeff Farber for his leadership as president during the past year. It has been a real pleasure working with Jeff and our Association has benefited from his service. When Jeff handed me the gavel at the end of our Annual Meeting in Calgary, we continued a long-standing tradition of passing executive duties from one board member to another as part of an orderly and well-planned transition. As I take the seat as IAFP's 91st president, I am humbled to have my name added to those who have served the Association before me in this manner and I am reminded that the greatness of IAFP is much bigger than any one person. Presidents and executive boards come and go, but the ideals that IAFP represents endure over time. It is our rich heritage and the collective efforts of all of our members and staff that truly make IAFP the wonderful Association it is.

Now, this brings me to the topic of my first message – the importance of IAFP maintaining a strong international focus. You might ask yourself, "Why should we be concerned about having a strong international focus when we still have opportunities right here in North America?" Well, that's true, but when it comes to food safety, things aren't really that simple. Let me summarize three good reasons why IAFP must maintain a strong international focus.

First, having a strong international focus is important, because it's the right thing to do.

Simply put, the global burden of foodborne disease is too high. The World Health Organization estimates that each year, unsafe food makes at least two billion people ill worldwide. Think about this, that's a staggering one third of the global population. Many of these individuals become seriously ill and many die due to unsafe food. In fact, the WHO estimates that worldwide, 2 million deaths occur annually from diarrhea, caused mainly by contaminated food and/or water. Now I wonder who among us would say that this is good enough. And lest you think that this is a problem only in developing countries, you don't have to look too far to see that foodborne disease is a substantial public health burden in developed countries too. In the US alone, the Centers for Disease Control and Prevention estimate that each year diseases caused by food may result in 325,000 serious illnesses resulting in hospitalizations, 76 million cases of gastrointestinal illnesses, and up to 5,000 deaths. Foodborne disease is a worldwide problem, which can benefit from collaboration, standardized approaches, and common solutions.

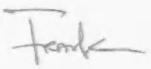
Second, having a strong international focus is important, because the food supply is becoming more global. Trends in the global production and distribution of food represent new challenges to food safety. As our global community expands, the business of moving food from the farm to the dinner table has become increasingly complex. Food is being distributed further than ever before; sometimes from one distant country to another, and foodborne disease outbreaks have the potential of being widespread. This trend is occurring worldwide. According to the United

Nations, certain food imports, such as high value foods, have increased not only in developed countries, but in developing countries too. Next time you sit at the dinner table to eat a well-balanced meal, pause to think about where the various products on the table may have come from. There's a good chance you're enjoying a meal that originated in many different parts of the world. The hazards in the food supply are not respecters of countries, or borders, so when it comes to food safety solutions, neither should we. When other countries win battles in the fight against foodborne disease, we all win.

Third, having a strong international focus is important, because it's part of our heritage and mission. Having an international focus has always been part of the spirit of our association, even when it was founded almost a century ago. In fact, our very first member list of 1912 includes members from the USA, Canada, and Australia. IAFP's founding members knew that there were common public health challenges shared worldwide that needed common solutions. Today, IAFP has members in 54 countries around the world, and very importantly, our stated mission is *To provide food safety professionals worldwide with a forum to exchange information on protecting the food supply*. Helping advance food safety worldwide is what we stand for and the main reason we exist.

So, what is IAFP doing to fulfill our mission? Well, in addition to already well-established programs, such as the distribution of our journals to 69 different countries around the world and our Annual Meeting that truly has international attendance, our strategic plan calls for an even greater emphasis on our international focus. For example, on November 30 and December 1, 2006, we will hold our second European symposium in Barcelona, Spain entitled Innovations in Food Safety Management. Our hopes are to hold international meetings on a more frequent basis, wherever and whenever they make sense, to allow for even greater regional participation. Accordingly, the Executive Board has developed and approved guiding principles for holding international meetings. In addition, knowing that students are our future scientists with tomorrow's food safety solutions, we have increased the number of travel scholarships for international students to attend our Annual Meetings. Also, because Affiliates are the backbone of the Association, our strategic plan calls for assisting in the establishment of even more international Affiliates in the near future. In recent years, thanks to the hard work of many dedicated members, we have established international Affiliates in New Zealand, Portugal, the United Kingdom, Brazil, Korea, and Mexico. And last but not least, realizing that precious resources are required to do many of the great things we still need to do, we are actively spreading the good news of our vision with a new promotional DVD in hopes of getting more contributions to the IAFP Foundation Fund.

During the coming year, I'm sure you'll hear more from us on what we're doing to advance food safety worldwide and maintain a strong international focus. Please join us in doing your part, whether big or small. Together, we can make a difference and improve the quality of life around the world.



P.S. If you have any questions, comments, or suggestions, please let me know. You can e-mail me at frank.yiannas@disney.com. Until next month, thanks for reading.

"The mission of the Association is to provide food safety professionals worldwide with a forum to exchange information on protecting the food supply."

"COMMENTARY"
FROM THE EXECUTIVE DIRECTOR

The September column is always a difficult column to write because as you read this column, our Annual Meeting has been completed for at least two weeks, but as I am writing, it is still two weeks prior to the meeting! We feel as if IAFP 2006 will be another very successful meeting and all of our pre-meeting indicators tell us that this is true. But, until the meeting takes place, it is difficult to determine the outcome and report upon it realistically. Thus, one of the difficulties of a print publication such as *Food Protection Trends*.

This got me thinking about providing an update on a few changes that could be in store. First, we are addressing the problem we encounter in quickly transferring information to IAFP Members through our print journals. Upon the conclusion of the Business Meeting at IAFP 2006, we will know whether the Membership accepted changes that will assist IAFP in communicating more rapidly with its Members. A couple of Bylaws changes will allow us to initiate an electronic newsletter that can be quickly assembled and distributed to Members with current content and items of interest.

A change would not eliminate or even change the content of *FPT*, but will allow IAFP to be more flexible with its communication methods. If the Bylaws changes were approved, the electronic newsletter will become the "official publication" for IAFP. *Food Protection Trends* has served this function since its beginning in 1980. The changes that you see as an IAFP Member will not be noticeable if you choose to continue receiving the print journals.

By DAVID W. THARP, CAE
EXECUTIVE DIRECTOR

"Our new publication, the electronic newsletter, will contain IAFP updates, food safety news, regulatory updates and research or short reports"

Food Protection Trends will continue to carry science-based, applications oriented articles, news, updates, and new industry products along with new Members and Annual Meeting information. Our new publication, the electronic newsletter, will contain IAFP updates, food safety news, regulatory updates and research or short reports. Many items will link to the IAFP Web page to keep you current on IAFP activities.

One of the driving forces behind the electronic newsletter is an effort to reduce the base Membership fees and to attract additional food safety professionals to IAFP. This caused us to take a look at a total dues restructure that will allow Members to select the journals or communications that you want. The base Membership fee will include the electronic newsletter. From there, you can choose to add *Food Protection Trends*, or the *Journal of Food Protection*, or both, or neither. You may add *JFP* Online to any combination of Membership options. In this manner, you get exactly what is of interest to you!

For those who are on a tight budget or those who may have access to journals through a library, this Member may only need to be a Member at the base level. Others (like me) would not want to give up the print versions of *FPT* or *JFP* and will want to continue to receive those publications. Still others may enjoy the flexibility of *JFP* Online and may not have the space to store back issues, so they may want to choose *JFP* Online along with the base Membership, thus saving valuable funds. The wonderful feature about this system is that you, the IAFP Member, have the opportunity to choose exactly what you want!

The second issue that was voted on at the Annual Business Meeting was to allow electronic voting in the Secretary election. Again, we do not know the outcome (at the time I am writing this article), but should it pass the vote, we expect voter participation to increase. We have seen a steady decline in the number of ballots cast in the Secretary election over the

past 5 to 10 years. It used to be that we would receive ballots from about 35% of the eligible voters. Now, we are down to 25%.

Many associations have migrated to electronic voting to make it easier for Members to cast their ballot and they have seen increased participation. The IAFP Executive Board wanted our Constitution and Bylaws to be able to accommodate an electronic vote, when appropriate. If the vote passes at the Business Meeting, because a change to the Constitution is also necessary, we will then have to distribute a mail ballot on this issue to all IAFP Members. That vote needs to pass by a two-thirds majority of votes received in order to be implemented.

Once all this is completed, and assuming it passes, we do not intend to conduct an electronic vote until 2008 because of the short amount of time until the next election (February 2007). The Executive Board wanted to have enough time to properly notify IAFP Members of this change.

We look forward to implementing these changes and hope that they make your Membership more valuable to you. Both the electronic newsletter and the dues restructure are slated to start up in January of 2007. As your Membership comes up for renewal throughout 2007, you will then be able to choose the options that fit your needs. Look for electronic voting to begin in 2008.

If you have any questions about these changes, feel free to contact me at the IAFP office.

A Special Thank You to Our Sponsors, Exhibitors, and Attendees for Making IAFP 2006 Such a Success Again This Year!

ARTICLES

Food Protection Trends, Vol. 26, No. 9, Pages 654–661

6200 Aurora Ave., Suite 200W, Des Moines, IA 50322-2864

International Association for Food Protection

Awareness and Perceived Risk of Pesticide and Antibiotic Residues in Food: Socioeconomic Variations among United States' Consumers

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SUMMARY

We investigated American consumers' awareness and perceptions of risk of pesticide and antibiotic residues in food, and how socioeconomic characteristics affect the consumers' awareness and risk perceptions. On the basis of a 2001 national telephone survey, we employed a statistical approach that takes into account possible correlations between awareness and risk perceptions and the fact that perceived risk data were collected in the survey only from those who were aware of a given issue. This study shows that awareness of one of the two residue problems was associated with a lower perceived risk of the other problem. Higher income, age, some-college-or-more education, and being the main meal preparer increased the probability of awareness of both kinds of residues as food safety problems. Although being Hispanic or Black decreased the probability of pesticide awareness, being Black decreased the probability of awareness of antibiotic residues as a problem. Among those who had heard of pesticide residues, higher income and being a Midwest resident had positive influences on the perceived risk associated with the residues. Perceived risk from pesticide residues was lower with more adults in the household; being female; being older, Hispanic or Black; and being the main meal preparer in the household. Among those who had heard of antibiotic residues, higher income and being Hispanic were associated with increased perception of the residues; however, the perceived risk was lower among females or Blacks.

A peer-reviewed article

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INTRODUCTION

Food safety risk perceptions have received considerable attention from researchers *(3, 4, 5, 6, 7, 8, 13, 14, 16, 21)*. This study focuses on consumer awareness and perceptions of risk from two specific food safety issues: pesticide and antibiotic residues in food.

The use of pesticides and antibiotics has increased the efficiency of food production in the United States *(11, 22, 23)*. Pesticides are used to kill or control pests and have contributed to dramatic increases in yields for most vegetable and fruit crops *(22)*; antibiotics are used to treat and prevent disease in animals and in food plants, and as a food additive to improve the growth rate of animals *(11)*. Nevertheless, pesticide residues can potentially have a wide range of adverse effects on human health, while antibiotics have been linked to the emergence of antibiotic-resistant strains of disease-causing bacteria such as *Salmonella*, *Campylobacter*, and *Escherichia coli (12, 23)*.

Several federal agencies, including the Environmental Protection Agency, Food and Drug Administration and US Department of Agriculture, have regulatory roles in the approval, testing, and monitoring of use of pesticides and antibiotics. Previous studies, however, have shown that many consumers are concerned about health risks associated with pesticide and antibiotic residues in the food they consume *(10, 21, 24, 31)*. Potential health effects of prolonged exposure to pesticide residues in foods, particularly on fresh fruits and vegetables, and incidents such as the Alar scare during the 1980s have caused heightened consumer concerns. Part of these concerns may have been reflected in a growing market for organic foods. According to the Organic Trade Association, organic product sales in the United States have grown between 17 and 21 percent each year since 1997 and reached $10.4 billion in 2003, with the largest share in fruits and vegetables *(25, 26)*. At the same time, some food manufacturers have promoted certain food products as, among other things, "antibiotic-free" or "no antibiotic residues" *(19)*.

Consumer awareness and perceptions of risk from pesticide and antibiotic residues in food can potentially affect how safe consumers perceive various foods to be and their choices of food products. To the extent that perceptions of risks do not always coincide with documented risks, a better understanding of consumer awareness and perceptions of risk from these residues can provide useful information for communicating with consumers about the two food safety issues. In addition, national demographics have been changing in recent years, with an increase in the number of people 65 years of age or older, regional population shifts to the West and the South, and increases in the numbers of Hispanics and Asians *(29)*. Thus, knowledge about how different population segments view these issues becomes more important, because consumer perceptions can influence the operations of the agricultural industry and the marketing of niche products such as organic produce, "antibiotic free" meats, and integrated pest management produce.

United States consumers' opinions about pesticide and antibiotic residues have been collected and examined previously. For example, the Food Marketing Institute (FMI) has asked primary food shoppers in the United States about how great a health risk they think residues from pesticides and antibiotics or hormones in livestock are *(10)*. Another survey asked about the extent to which respondents saw pesticide residues in food and hormones in poultry and meat as "the most pressing food safety concern" *(3)*. Two surveys showed that females, individuals from lower income households, and individuals who attained a high-school or less education were particularly concerned about pesticide residues *(4, 13)*. Individuals with children living in the household and older individuals were more concerned about pesticide residues *(13)*. Another survey-based study reported that females and older individuals perceived a higher risk in antibiotics in animal feeds, while more educated individuals perceived a lower risk *(16)*.

However, two methodological limitations of previous studies should be addressed to achieve a better understanding of how socioeconomic characteristics affect consumer opinions. The first limitation relates to how opinions have been collected. Previous surveys asked respondents about their concerns regarding the two issues, without first determining whether the respondents were aware of the issues. When the question was asked in this manner, some respondents might assumed that because a topic was asked about, it must be of concern and hence they might have overstated the level of their concern. To avoid such presupposition effects and to obtain more accurate responses to level-of-concern questions, Sterngold, Warland and Herrmann *(30)* proposed a filter question, asked before a concern question, to determine first if a respondent was aware of an issue. Comparing results from responses to questions with and without filter questions, they found that fewer individuals expressed concerns over pesticides and other chemicals in food if a filter approach had been used than when it was not. Hence, previous surveys, which invariably used the non-filter approach, yielded biased estimates of consumer concerns of the two food safety issues. Furthermore, as found in other research (for example, *15*), the non-filter approach and the filter approach can produce a different picture of how socioeconomic characteristics affect the two concerns. The second methodological limitation relates to how survey data were analyzed to identify relationships between concerns and socioeconomic characteristics. As reported in Rimal et al. *(27)*, consumer concerns about the two residue issues are correlated. Yet, in all previous studies on associations between concerns and socioeconomic characteristics, each food safety concern was investigated individually. Statistically, this omission means that available information in previous survey data was not used to its fullest extent. In particular, any possible interactions among the two food safety issues were completely ignored.

In this study, we investigated American consumers' awareness and perceived risk of pesticide and antibiotic residues in food, especially the seriousness of risk, as well as the effect of socioeconomic variations on the awareness and risk perceptions. The data were generated from a 2001 national survey. We used a statistical modeling approach that allows us to take into account the special survey design that used the filtered approach and to examine the interactions among awareness and risk perceptions of the two food safety issues. This approach extends previous research by addressing the studies' methodological limitations, thus allowing better identification of those who are more likely to be aware of pesticide and antibiotic residues as food safety problems and who are more likely to perceive a higher level of the seriousness of these issues.

MATERIALS AND METHODS

Survey and data

We used data collected from the 2001 Food Safety Survey (FSS) conducted by the Food and Drug Administration (FDA) in collaboration with the US Department

TABLE 1. Definitions and sample statistics for the dependent variables[a]

Variable	Definition	Mean	S.D.
d_1	Have heard about pesticide residues as problems in food (yes = 1, no = 0)	0.82	
d_2	Have heard about antibiotic residues as problems in food (yes = 1, no = 0)	0.34	
y_1	Seriousness of pesticide residues as problems in food (very serious problem = 4 … not a problem = 1)	2.38	0.84
	Subsample: unaware of problems with antibiotic residues (d_2 = 0)	2.43	0.83
	Subsample: aware of problems with antibiotic residues (d_2 = 1)	2.30	0.85
y_2	Seriousness of antibiotic residues as problems in food (very serious problem = 4 … not a problem = 1)	2.52	0.82
	Subsample: unaware of problems with pesticide residues (d_1 = 0)	2.86	0.70
	Subsample: aware of problems with pesticide residues (d_1 = 1)	2.49	0.82

[a]Source: FDA Food Safety Survey, 2001. All sample statistics are weighted; see text for details.

of Agriculture's Food Safety and Inspection Service. The random-digit-dialing telephone survey, conducted April 30, 2001 to August 28, 2001, used the Computer-Assisted-Telephone-Interview technique. The target population was non-institutionalized adults (age 18 years or more) in the United States. Households were selected by use of a nationally representative single-stage sample of telephone numbers generated from the GENESYS sampling system *(17)*. For a household with multiple adults aged 18 or older, the adult member with the most recent birthday was selected for the interview. A total of 4,482 adults, mostly English-speaking, completed the survey, yielding a response rate of 36% calculated per the Response Rate 3 (RR3) defined by the American Association for Public Opinion Research *(1)*.

We used two pairs of an awareness question and its follow-up risk perception question, one pair for each residue issue. Respondents were asked about pesticide residues and antibiotic residues, using a two-step procedure. First, they were asked an awareness question: "Have you heard about pesticide residues (or antibiotic residues) as problems in food?" Responses were coded as "yes" = 1 and "no" = 0 (including self-volunteered "don't know."). If the response to the awareness question was "yes," a risk perception question was then asked: "Would you say that pesticide residues (or antibiotic residues) in food are a very serious food safety problem (response coded as 4), a serious food safety problem (coded as 3), somewhat of a problem (coded as 2), or not a food safety problem at all (coded as 1)?"

In this study, the influences of a variety of individual socioeconomic characteristics on awareness and perception of risks from antibiotic and pesticide residues were examined. Based upon results from prior studies (e.g., *3, 4, 6, 13, 16*), the characteristics selected were household income, number of adults living in the household, age, gender, presence of young children (≤ 5 years of age), education (has completed at least some college education or not), race (White, Black, other), Hispanic ethnicity, meal preparer status, and geographic region (Midwest, West, Northeast, and South). All of these characteristics, except income, number of adults, and age, were coded as binary (yes-no) variables. Income was classified into 11 categories, from 1 (<$10,000) to 11 (>$100,000). Actual reported numbers of adults and age were trimmed at the 99th percentile (5 adults and 84 years, respectively).

We used data from 3,684 respondents (approximately 75% of all respondents) of the 2001 FSS, after deleting data from respondents who had not provided information on all variables used in the study. The data were weighted to adjust for probability of selection (number of residential telephone numbers and number of adults in the household) and to adjust the sample distributions to the race, education, and gender distributions in the 2001 Current Population Survey. Both descriptive statistics and regression analysis were weighted.

Statistical analysis

We used the PROC FREQ, PROC MEANS, and PROC CORR procedures in the Statistical Analysis System (SAS), Version 8.2 *(28)*, to generate descriptive statistics and statistics of significance. We also developed a regression model to investigate the effects of socioeconomic characteristics on awareness and levels of concern regarding the two residues. This model was designed to address the methodological limitations in previous research to obtain a better understanding of consumer opinions; it accommodates the special sample design, potential interrelationships between the two food safety issues, and the discrete nature of the survey responses (0 or 1 for awareness and 1 to 4 for perception). As stated above, consumer responses were collected in a two-step procedure in which perception of risk was elicited only from respondents who were aware of these issues, i.e., who had heard of pesticide (or antibiotic) residues as possible problems in food. Hence, the perception data can be regarded as having been "filtered" by responses to the awareness question. The two-step, filtered nature of the data can be accommodated statistically with a sample-selection mechanism, which is described below. Our model also considered possible interrelationships between the two food safety issues, as suggested in Rimal et al. *(27)*. To accommodate the potential correlation between the two residue issues, we set up our model so that it could estimate the effects of the socioeconomic charac-

teristics on both issues simultaneously rather than on one issue at a time.

Our regression model included two ordinal response equations (perceptions), each of which was subject to sample selectivity introduced by the filtering question (awareness). The ordinal response equations are extensions from McKelvey and Zavoina *(18)*, and the selection equations from Meng and Schmidt *(20)*, both in the single-response context. Suppressing observation subscripts, the two filtering (awareness) equations are

$$d_i = 1 \text{ if } z'\alpha_i + u_i > 0$$
$$= 0 \text{ if } z'\alpha_i + u_i \leq 0,\ i = 1,2 \quad (1)$$

where, for each equation *(i)*, d_i is a binary variable characterizing the filter outcome, vector z is comprised of predictor variables, α_i is a parameter vector, and u_i is a random error. Governed by the filtering mechanism (1), the two ordinal response (level of perceived risk) equations are

$$y_i = j \text{ if } d_i = 1 \text{ and } \mu^i_{j-1} < x'\beta_i + v_i < \mu^i_j$$
$$= \text{unobserved if } d_i = 0$$
$$j = 1,\ldots,4;\ i = 1, 2 \quad (2)$$

where, for each i, j is the observed category in y_i (with values ranging from 1 to 4), x is a vector of socioeconomic variables, β_i is a parameter vector, v_i is a random error, and the μ's are threshold parameters, normalized for identification such that $\mu^i_0 = -\infty$, $\mu^i_1 = 0$, and $\mu^i_4 = \infty$ (μ^i_2 and μ^i_3 are estimatable). For statistical estimation, the error terms u_1, u_2, v_1 and v_2 were assumed to be distributed as four-variate standard normal with zero means, unitary variances, and a finite covariance matrix.

We estimated the model with the method of maximum likelihood, by programming in GAUSS *(2)*. Although not reported here, several regression tests conducted in this study indicated that our approach resulted in statistical efficiency and was preferable to alternative approaches that did not accommodate possible correlations between the two residue problems or the fact that the level of perceived risk responses were filtered by the awareness responses.

RESULTS

The descriptive statistics of the sample used in this study are presented in Tables 1 and 2. As shown in Table 1, 82% of individuals included in the sample had heard about problems associated with pesticide residues in food, while 34% had heard about antibiotic residues as problems in food. Awareness of the two residue problems was significantly correlated ($\chi^2 = 136.05$, $P < 0.0001$), as were the levels of perceived risk of the two residue problems among those who were aware of both problems (Spearman coefficient = 0.58, $P < 0.0001$). The latter result is consistent with the finding reported by Rimal et al. *(27)*. These two test statistics provided partial support for our regression approach, in that significant interrelationships between the two food safety issues did exist.

Those who were aware of the residue problems generally perceived a moderate level of risk with regard to pesticide residues (mean = 2.38 on a scale from 1, not a problem, to 4, a very serious problem) and antibiotic residues (mean = 2.52). The level of perceived risk among those who had heard about the residues was significantly higher for antibiotic residues than for pesticide residues ($P < 0.0001$). Our finding differs from that obtained from a telephone survey of New Jersey residents, in which respondents rated the risk of antibiotics used in livestock at 1.51 and pesticide residues at 1.44, respectively, on a 1 (very risky) to 3 (not risky) scale *(13)*. Our finding also appears to be opposite to the results of a 2001 survey of visitors at a University Open House at the University of Illinois, Urbana-Champaign, in which the average ratings of concern were 3.4 and 3.1, on a scale of 1 (no concern) to 5 (very strong concern) for pesticide residues in food and for hormones in poultry and meat, respectively *(3)*. Our finding also differs from that found in a 2002 FMI national telephone survey: 64% of primary food shoppers said "residues from pesticides" were a "serious health risk" while 40% said "antibiotics or hormones in livestock" were a "serious health risk" *(10)*. A possible cause of the difference between our results and those of others is that those who had heard of the residues as problems in food were more knowledgeable about the benefits of pesticide use than about the benefits of antibiotic use. As noted by Dunlap and Beus, the public is ambivalent about pesticides; although the level of concern about pesticides is relatively high, the public is not confident that pesticide use in agriculture can be eliminated *(8)*. If fewer individuals understand why antibiotics are used in livestock and plants, then it is possible that the public perceives antibiotic residues to be a more serious problem than pesticide residues, as found in this study. Another possible cause of the difference between our and other results is that exposure to pesticide residues was perceived to be more controllable (for example, by washing and peeling produce) than exposure to antibiotic residues, which would require purchasing a different kind of product. The literature suggests that the more controllable a risk is perceived to be, the lower the perceived risk *(9)*.

Results of the FSS and the FMI surveys, both nationally representative, may not be directly comparable because the FMI survey asked all respondents about the degree of seriousness without first asking about awareness, while the FSS asked only those who were aware of the issues about the degree of seriousness. In addition, the FMI survey asked about the issues in terms of a health risk, while the FSS asked in terms of "problems in food"; about "antibiotics or hormones in livestock", while the FSS asked about "antibiotic residues"; and about eight other food safety issues (such as bacteria or germs, additives and preservatives) in the same question, while the FSS asked about these two issues only. Hence, although these statistics may help us understand consumers, it might be prudent for users of these statistics to keep in mind the differences described above.

A similar pattern appeared in the levels of perceived risk of the two residues. Regarding pesticide residues, those who had heard of antibiotic residues perceived a lower level of risk than those who had not heard of antibiotic residues (2.30 versus 2.43, $P < 0.0001$) (Table 1). Likewise, those who had heard of pesticide residues perceived a lower level of risk of antibiotic residues than those who had not heard of pesticide residues (2.49 versus 2.86, $P < 0.01$). The similarity in the pattern of how awareness of one residue was related to the level of perceived risk of the other residue shows the possibility that awareness of similar food safety issues is related to a lower perceived risk of any individual issue. A plausible explanation for this observation is that the significance of a given issue fades when consumers take a broader perspective of all related and similar potential risks in food. When consumers take a broader perspective and realize that there are other, similar risks in food, they may feel that any individual risk is not as high as it would be if there were no other risks.

The demographic characteristics (i.e., the predictor variables of our regression model) of the full sample are shown in Column 3, Table 2. Overall, the sample consisted of consumers with an average household income in the $50,000–$60,000 range, from a household with about two adults, and with an average age of 44. Fifty-one percent of the sample were fe

TABLE 2. Definitions and sample means of predictor variables[a]

(1)	(2)	(3)	(4)[b]	(5)[b]	(6)[b]	(7)[b]
Variable	Definition	Full Sample (n=3,684)	$d_1 = 0$ $d_2 = 0$ (n=464)	$d_1 = 0$ $d_2 = 1$ (n=79)	$d_1 = 1$ $d_2 = 0$ (n=1,858)	$d_1 = 1$ $d_2 = 1$ (n=1,283)
Income	Household pre-tax income: 1 (< $10,000) to 11 (> $100,000)	5.32	4.74	4.57	5.26	5.77
		(2.97)	(3.05)	(3.40)	(2.93)	(2.93)
Adults	Number of adults (age ≥18) residing in household	2.27	2.33	2.48	2.27	2.23
		(0.93)	(1.06)	(1.37)	(0.94)	(0.82)
Age	Age of respondent	43.96	39.07	46.54	42.74	48.04
		(16.12)	(18.08)	(17.99)	(16.16)	(14.23)
Female	Respondent is female	0.51	0.45	0.50	0.51	0.52
Children ≤ 5	One or more children present in household	0.18	0.23	0.22	0.19	0.14
College	Some college or higher education	0.53	0.38	0.35	0.52	0.62
Hispanic	Respondent is Hispanic	0.10	0.16	0.34	0.09	0.07
Black	Respondent is non-Hispanic Black	0.11	0.16	0.06	0.12	0.09
Other race	Respondent is non-White, non-Black, and non-Hispanic	0.05	0.04	0.02	0.04	0.06
White	Respondent is non-Hispanic White (reference)	0.74	0.64	0.58	0.75	0.78
Meal prep.	Respondent is a major meal preparer	0.56	0.48	0.68	0.56	0.60
Midwest	Resides in the Midwest	0.24	0.21	0.20	0.25	0.23
West	Resides in the West	0.20	0.17	0.22	0.20	0.20
Northeast	Resides in the Northeast	0.19	0.19	0.18	0.19	0.20
South	Resides in the South (reference)	0.38	0.43	0.40	0.37	0.37

[a]Standard deviations in parentheses. All sample statistics are weighted; see text for details.

[b]In these columns, d_1 denotes pesticide residues, d_2 antibiotic residues, 1 aware, and 0 unaware. For example, the characteristics shown under Column 7, where $d_1 = 1$ and $d_2 = 1$, are for the subgroup who were aware of both residue problems.

male, 18% came from a household with one or more young children, 53% had "some college or higher" education, 10% were Hispanic, 74% were non-Hispanic White, and 56% were main meal preparers in the household.

Because this study examined two residue problems simultaneously, Table 2 also reports, in Columns 4–7, subgroup characteristics according to whether consumers were aware of a problem and which problem it was. Compared with consumers who were not aware of a pesticide residue problem, those who were aware of the problem: (1) came from households with higher income, 5.26 (Column 6) and 5.77 (Column 7) versus 4.74 (Column 4) and 4.57 (Column 5), regardless of awareness of antibiotic residues; (2) had "some college or higher" education, 52% and 62% versus 38% and 35%; (3) were less likely to come from a household with one or more young children, 19% and 14% versus 23% and 22%; (4) were more likely to be non-Hispanic White, 75% and 78% versus 64% and 58%; (5) were less likely to be Hispanic, 9% and 7% versus 16% and 34%; and (6) were more likely to reside in the Midwest but not in the South.

On the other hand, compared with consumers who were not aware of an antibiotic residue problem, those who

TABLE 3. Maximum likelihood estimates of the simultaneous ordinal response model[a,b]

	Awareness		Level of perceived risk	
Variable	Pesticide	Antibiotic	Pesticide	Antibiotic
Constant	–0.480***	–2.378***	1.562***	0.788
Income	0.186***	0.219***	0.310***	0.267***
Adults	0.115	0.358*	–0.386***	0.011
Age	0.044***	0.057***	–0.025***	–0.014
Age^2 (x 10^{-2})	–0.039***	–0.043***	0.026***	0.022
Female	0.086*	–0.031	–0.220***	–0.309***
Children ≤ 5	–0.050	–0.033	0.052	0.030
College	0.300***	0.254***	0.069	0.032
Hispanic	–0.406***	0.135**	–0.165**	0.240***
Black	–0.151***	–0.101*	–0.266***	–0.461***
Other race	0.130	0.216***	–0.095	–0.083
Meal preparer	0.083*	0.143***	–0.116***	–0.049
Midwest	0.069	–0.062	0.114***	0.118
West	0.183***	–0.003	–0.008	–0.076
Northeast	0.011	–0.037	–0.023	–0.111
Log-likelihood	–8561.803			

[a] Asterisks indicate levels of statistical significance: *** = 1%, ** = 5%, * = 10%.

[b] The estimated threshold values, (μ^1_2, μ^1_3, μ^2_2 and μ^2_3 in Equation (2)), are all positive and indicate the ordinal response model is appropriate for the data. In addition, all error correlations (among the error terms in Equations (1) and (2)) are significant by a traditional standard, which justifies the use of the statistical model (accommodation of filtering and estimation of the equations in a system). These additional parameter estimates are available upon request.

were aware of the problem: (1) were older, with average ages of 47 (Column 5) and 48 (Column 7) versus 39 (Column 4) and 43 (Column 6), regardless of awareness of pesticide residues; and (2) were more likely to be the main meal preparer in the household, 68% and 60% versus 48% and 56%.

Table 2 also shows that when the two residue problems were taken together, there were more "some-college-or-more" educated consumers (62%, Column 7) among those who were aware of both residue problems than among any of the other three subgroups of consumers (Column 4–6). Among those who were aware of at least one of the problems, half were female (Columns 5–7), whereas 45% of those who were unaware of either problem were female (Column 4), and more of those who were aware of at least one of the problems were the main meal preparer in the household. The average ages of those who were aware of at least one of the problems were also higher (43 to 48 versus 39).

In addition to the descriptive statistics just described, the regression results provide further details about the effects of individuals' socioeconomic characteristics on their awareness and level of perceived risk. Correlations among the error terms of the two awareness equations and the error terms of the two perceived risk equations were significant at the 0.01 level (Table 3). These estimates provided empirical justification for examining the two residue problems simultaneously.

As shown in Table 3, income had positive effects on the awareness of both pesticide and antibiotic residues as well as on the levels of perceived risk associated with these residues among those who were aware of the problems. The positive role of income on perceived risk of pesticide residues in this study stands in contrast to findings in previous studies. Govindasamy and Italia reported that their New Jersey respondents with annual household incomes under $40,000 were more likely to believe that pesticide residues were highly risky *(13)*, and Byrne, Gempesaw and Toensmeyer reported that pesticide residue concerns were lower among higher-income respondents to a telephone survey in the Delmarva Peninsula *(4)*. Our study shows that the higher

the number of adults in a household, the more likely that an individual had heard of antibiotic residue problems. On the other hand, such individuals perceived a lower risk associated with pesticide residues. In contrast, household size was not associated with perceived risk of pesticide residues in Govindasamy and Italia *(13)*.

For both pesticide and antibiotic awareness, the estimated effects of age were positive whereas the estimated effects of the squared term of age were negative, which shows that, although older individuals were more likely to have heard of either problem, the age-awareness relationship was curvilinear; awareness increased until a certain age, after which the magnitude of increase declined. The level of perceived risk of pesticide residues also exhibits a curvilinear relationship with age, decreasing up to a certain age, after which the magnitude of decrease declined. By comparison, Govindasamy and Italia found that respondents who were under 35 perceived a lower risk of pesticide residues *(13)*. Our study shows no association between age and perceived risk of antibiotic residues, in contrast to the previous finding that age had a positive effect on perceived risk of using antibiotics in animal feeds *(16)*.

The effects of gender on awareness and perceived risk were mixed. Females were more aware of pesticide residues, but perceived a lower risk from either pesticide or antibiotic residues, compared with males. A lower perceived risk among females might indicate that females feel more strongly than males that they know how to manage the risk, e.g., by washing produce and by selecting food products. Meanwhile, our results are in contrast to previous findings that females were more concerned about pesticide residues *(4, 13)* or antibiotic residues *(16)*.

Having a "some college or higher" education had positive effects on awareness of both residues but did not affect the level of perceived risk from either residue. These findings differ from previous findings that individuals who had attained such a level of education were less concerned about pesticide residues *(4)*.

We found evidence of racial and ethnic differences. Compared to non-Hispanic Whites, Hispanics were less likely to have heard of pesticide residues, and, among individuals who were aware of the residues, Hispanics perceived a lower risk from pesticide residues. This pattern, however, is reversed in the case of antibiotic residues. Non-Hispanic Blacks were less aware of and perceived a lower risk from either residue, while individuals of other races were more aware of antibiotic residues, relative to non-Hispanic Whites.

Relative to individuals who rarely or never prepare meals in their households, main meal preparers were more aware of both residues but perceived a lower risk associated with pesticide residues. Regional differences were also present, with individuals residing in the Midwest perceiving a higher risk from pesticide residues and individuals residing in the West being more aware of pesticide residues compared with individuals from the South. This may be because the Midwest is a more agriculturally intensive area for grains and livestock and because pesticide residues have received heightened attention in the West, especially in California *(32)*.

In conclusion, this study reveals new findings about American consumers' awareness and perceptions of risk, particularly the seriousness of the risk, from pesticide and antibiotic residues, and about how socioeconomic subgroups of consumers differ in their awareness and risk perceptions. The new findings, based on a national survey and on unique survey and analytical approaches, reveal some perspectives of consumers that differ from those of previous research. In particular, awareness of antibiotic residues as a food safety problem was relatively low, but those who had heard of the residues perceived them to be a more serious problem than pesticide residues. This result suggests that antibiotics-related product promotion is relatively ineffective. The promotion would have more appeal to those who are aware of the residues and perceive the residues to be a food safety problem. In addition, the promotion would likely be more effective with those who understand that residues might be more effectively reduced through food selection than through food preparation. Meanwhile, because this result may be partially attributable to lack of knowledge about the use and functions of antibiotics in food production, perceived risk of or concern about antibiotic residues may be lessened by communicating the purposes of antibiotics use.

In this study, we used data from a survey that collected more accurate consumer opinions on the issues of pesticide and antibiotic residues than prior similar surveys. The unique data set allows a more comprehensive investigation of both awareness and perceptions of the two food safety issues than would be possible by other means. The results suggest that it is preferable statistically to recognize that there is a correlation between the two issues and that data on the level of perceived risk are more accurate when collected from those who are aware of the issues. We must remind readers, however, that our results may not be directly comparable to those of other surveys. Our data differ from other data in question wording, measurement, mode of data collection, and sampling frame. Also, our statistical approach has not been employed in previous research.

Finally, in future research, it may be useful to explore how our approach may be extended to other food safety issues. For example, correlations likely exist between awareness and perceived risks associated with foodborne illness caused by different types of pathogens (e.g., *Salmonella*, *Campylobacter*, and *E. coli* O157:H7) or related to different sources (e.g., homes and restaurants), or different food vehicles (e.g., poultry and red meat). In addition, it is plausible to expect upward biases in survey-based estimates of these perceived risks if survey respondents are not asked first about their awareness of the risks. In these circumstances, the approach used in this study should help enhance our understanding of consumer opinions.

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Food Protection Trends, Vol. 26, No. 9, Pages 662–667

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Comparison of Treatment of Fresh-cut Lettuce and Diced Tomatoes with Sodium Hypochlorite and Calcium Hypochlorite for Effects on Microbiological and Sensory Qualities

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SUMMARY

A study was done to determine if the type of hypochlorite salt [NaOCl and $Ca(OCl)_2$] used to prepare chlorinated water for sanitizing fresh-cut iceberg, Romaine, and mesclun lettuce, and diced tomatoes affects lethality to microflora naturally occurring on the produce, as well as sensory quality during subsequent storage at 4°C for up to 13 days. The type of hypochlorite salt did not have a significant effect ($P > 0.05$) on reductions in mesophilic aerobic microorganisms (total counts) or yeasts and molds, regardless of the concentration of free chlorine (50 – 200 μg/ml) in solutions used to treat produce. Appearance, color, aroma, texture, and overall quality of treated fresh-cut lettuce and diced tomatoes were likewise unaffected by the type of hypochlorite salt used to prepare chlorine treatment solutions.

A peer-reviewed article

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INTRODUCTION

Outbreaks of salmonellosis, shigellosis, and *Escherichia coli* O157:H7 and viral infections have been associated with consumption of fresh produce *(7)*. In some countries, minimally processed produce is routinely washed with chlorinated water to reduce or eliminate pathogenic and spoilage microorganisms *(3)*. Sodium hypochlorite (NaOCl) traditionally has been used to prepare treatment solutions containing desired concentrations of free (available) chlorine.

It is known that treatment of some types of fresh-cut produce with calcium can result in a firming of tissue texture, thereby reducing the amount of fluid released, with a consequent preservation of sensory quality and extension of shelf life *(8, 10, 13)*. The role of calcium in prolonging shelf life is attributed in part to stabilization of cell membranes by reacting with negatively charged phospholipids and proteins to prevent solute leakage *(5, 11)*. Theoretically, treatment solutions containing a given concentration of free chlorine at a particular pH and temperature should be equally effective in killing microorganisms on produce, regardless of the type of hypochlorite salt, i.e., NaOCl or calcium hypochlorite [$Ca(OCl)_2$], used to achieve that concentration. A potential added benefit of using $Ca(OCl)_2$ may be the retention of sensory quality resulting from the presence of calcium in the treatment solution that may not be achieved using NaOCl. A study was done to test this hypothesis.

Objectives of the study were to determine the effectiveness of NaOCl and $Ca(OCl)_2$ in reducing populations of microorganisms naturally occurring on fresh-cut lettuce and diced tomato, and to determine the sensory quality of treated lettuce and tomatoes during subsequent storage.

MATERIALS AND METHODS

Produce studied

Fresh-cut iceberg lettuce (*Lactuca sativa* var. *capita*), fresh-cut Romaine lettuce (*L. sativa* var. *longifolia*), mesclun lettuce, and diced Roma cv. tomatoes were studied. Iceberg and Romaine lettuce, purchased at three different retail stores in Griffin, GA, was adjusted to 3°C. Lettuce purchased at the three stores was designated as three replicate lots tested in three separate trials. Wrapper leaves were removed and discarded. The inner leaves were cut with a stainless steel knife into approximately 4 × 4 cm pieces. Mesclun lettuce, consisting of a mixture of baby lettuce (baby green and Romaine, tango, baby green and red oak, lolla rosa, baby green and red leaf, and/or baby green and red butter) and baby greens (red Swiss chard, mizuna, tatsoi, baby spinach, and/or arugula) frisee, and radicchio, was obtained from a commercial fresh-cut produce plant. It had not been treated with a sanitizer.

Organically grown tomatoes (*Lycopersicon esculentum* Mill, Roma cv.), purchased at three different retail stores, served as three replicate lots used in three trials. Tomatoes at 21°C were washed by immersing in sterile tap water (1:2, wt:vol) at 21°C and agitating for 30 s, followed by immersing (1:2, wt:vol) in NaOCl solution (10 µg/ml free chlorine in 0.05 M potassium phosphate buffer, pH 6.8) at 4°C for 30 s, with agitation to reduce surface microflora. Tomatoes were drained and diced into approximately 1-cm^3 pieces with a stainless steel knife. Diced tomatoes were immersed in sterile deionized water (1:2, wt:vol) at 4°C and agitated for 30 s to facilitate removal of seeds and external tissue fluids, followed by draining. Fresh-cut lettuce and diced tomatoes were held at 4°C for no longer than 10 min before treating with hypochlorite solutions.

Preparation of hypochlorite solutions

Chlorine treatment solutions were prepared by adding NaOCl (Sigma-Aldrich, St. Louis, MO) or $Ca(OCl)_2$ (PPG Industries, Inc., Pittsburgh, PA) to sterile 0.05 M potassium phosphate buffer (pH 6.8). Free chlorine concentrations of 50, 100, and 200 µg/ml were tested. Sterile deionized water was used as a control. Concentrations of free chlorine in treatment solutions were determined using a Hach colorimeter (model DR/820, Hach Company, Loveland, CO).

Procedure for treatment and storage conditions

Lettuce (400 g) at 4°C was immersed in 4,000 ml of NaOCl or $Ca(OCl)_2$ solution (2 – 3°C) containing 0 (control), 50, 100, and 200 µg/ml free chlorine and agitated for 30 s. Surface water and chlorine solutions were removed from the lettuce by centrifugation (2 revolutions/s for 15 s) using a salad spinner (The Kitchen Collection, Inc., Chillicothe, Ohio). Diced tomatoes (300 g) at 4°C were immersed in 3,000 ml of water or hypochlorine solution (2 – 3°C), followed by thorough draining. Control and treated fresh-cut lettuce and diced tomatoes (50 g) were separately placed in bags (CP930 film, OTR 300 cm^3/100 in^2/24 h; Cryovac Inc., Duncan, S.C.) measuring 20 × 30 cm and 15 × 20 cm, respectively, and heat sealed under ambient atmosphere. Produce stored at 4°C for up to 13 days was analyzed for microbiological and sensory quality.

Microbiological analysis

Untreated (no water or chlorine treatment) fresh-cut lettuce and diced tomatoes, as well as lettuce and tomatoes treated with water (control) or chlorinated water, were analyzed for populations of mesophilic aerobic microorganisms (total counts) and yeasts and molds. Untreated produce was analyzed for microbiological quality before treating with water or hypochlorite solution. Treated produce was analyzed immediately after being subjected to sensory analysis on days 0, 3, 6, 10, and 13 of storage at 4°C.

Samples (50 g) were placed in stomacher 400 bags (Seward Medical Ltd., London, U.K.) and 200 ml of sterile 0.1% peptone water was added. The mixture was pummeled at normal speed for 1 min in a stomacher 400 blender (Seward Medical Ltd.). Undiluted samples (0.25 ml in quadruplicate and 0.1 ml in duplicate) and samples serially diluted in sterile 0.1% peptone water (0.1 ml in duplicate) were surface plated on plate count agar (PCA; BBL/Difco, Sparks, MD) and dichloran rose bengal chlorampenicol agar (DRBC agar; BBL/Difco) to determine populations of mesophilic aerobic microorganisms and yeasts/molds, respectively. The PCA plates were incubated at 30°C for 48 – 54 h and DRBC plates were incubated at 25°C for 5 days before colonies were counted. Data are presented on the basis of log CFU/g of produce.

Sensory analysis

Samples (50 g) of fresh-cut lettuce and diced tomatoes stored for 0, 3, 6, 10, and 13 days at 4°C were analyzed for sensory attributes. Lettuce (50 g) was placed on a sterile white plate (22 cm diameter) and tomatoes (50 g) were placed in a sterile white bowl (15 cm wide at brim, 5 cm deep; 355 ml) before being presented to panelists. A control sample, together with samples treated with 50, 100, or 200 µg/ml NaOCl or $Ca(OCl)_2$ (a total of seven samples), were coded with random three-

TABLE 1. Populations of mesophilic aerobic microorganisms (total count) on fresh-cut lettuce and diced tomatoes as affected by treatment and storage time

Produce	Treatment	Chlorine conc. (μg/ml)	Population (log CFU/g)[1] 0 day	3	6	10	13
Iceberg lettuce	None		AB 4.17				
	Water	0	A 4.41 D	A 5.71 C	AB 6.42 B	AB 7.25 A	A 7.19 A
	NaOCl	50	A 4.47 D	B 5.13 C	AB 6.27 B	A 7.43 A	A 7.44 A
		100	BC 3.60 E	B 4.95 D	AB 6.27 C	ABC 7.00 B	A 7.58 A
		200	C 3.16 D	C 4.32 C	AB 6.01 B	AB 7.24 A	A 7.50 A
	$Ca(OCl)_2$	50	AB 3.86 B	BC 4.60 C	B 5.96 B	C 6.65 A	B 6.68 A
		100	AB 3.95 E	BC 4.86 D	AB 5.97 C	C 6.67 B	A 7.54 A
		200	AB 4.13 D	B 5.00 C	A 6.45 B	BC 6.93 AB	A 7.36 A
Romaine lettuce	None		AB 5.59				
	Water	0	A 5.84 B	A 6.54 AB	A 7.55 A	A 7.58 A	B 5.85 B
	NaOCl	50	ABC 5.31 D	AB 6.32 C	B 7.09 B	A 7.62 AB	A 7.93 A
		100	BC 4.95 C	B 5.82 B	C 6.53 B	A 7.38 A	A 7.65 A
		200	ABC 5.25 D	AB 6.38 C	B 7.02 BC	A 7.16 B	A 8.05 A
	$Ca(OCl)_2$	50	BC 5.06 C	AB 6.34 B	A 7.55 A	A 7.50 A	A 7.69 A
		100	BC 5.13 C	A 6.74 B	AB 7.37 A	A 7.16 A	A 7.41 A
		200	C 4.90 C	AB 6.15 B	AB 7.43 A	A 7.48 A	A 7.54 A
Mesclun lettuce	None		A 6.08				
	Water	0	A 5.78 C	A 6.34 B	ABC 6.77 B	A 7.59 A	A 7.83 A
	NaOCl	50	B 4.43 D	AB 5.85 C	BC 6.64 BC	AB 7.28 AB	A 7.54 A
		100	AB 5.07 D	AB 5.89 C	AB 6.84 B	AB 7.20 A B	A 7.67A
		200	AB 4.93 B	B 5.56 B	A 7.20 A	AB 7.15 A	A 7.64 A
	$Ca(OCl)_2$	50	AB 5.27 C	AB 5.92 BC	AB 6.91 AB	AB 7.20 A	A 7.58 A
		100	A 6.19 C	A 6.24 C	C 6.32 C	AB 7.10 B	A 7.62 A
		200	A 6.08 C	AB 6.09 C	ABC 6.76 B	B 6.86 B	A 7.77 A
Diced tomatoes	None		A 3.85				
	Water	0	A 3.90 B	BC 4.27 B	B 4.53 B	ABC 5.95 A	
	NaOCl	50	A 4.10 B	B 4.58 B	AB 4.86 B	AB 6.45 A	
		100	A 3.78 C	C 3.70 C	B 4.31 B	CD 5.19 A	
		200	A 4.13 A	C 3.86 A	B 4.45 A	D 4.60 A	
	$Ca(OCl)_2$	50	A 4.21 C	A 4.21 C	A 5.66 B	A 6.71 A	
		100	A 3.98 B	A 3.98 B	B 4.23 B	BC 5.93 A	
		200	A 3.81 B	A 3.81 B	B 4.26 B	BC 5.82 A	

[1]Within the same type of produce, values in the same column that are not preceded by the same letter are significantly different ($P \leq 0.05$). Values in the same row that are not followed by the same letter are significantly different ($P \leq 0.05$).

digit numbers and simultaneously presented to each panelist on each day of analysis. An untrained panel consisting of 12 – 15 technicians and graduate students in the Center for Food Safety and Department of Food Science and Technology at the University of Georgia evaluated produce for appearance, color, aroma, texture, and overall quality. Panelists subjectively evaluated the texture of lettuce and tomatoes by prodding with a plastic rod (approximately 1 cm diam. × 22 cm long). Sensory attributes were rated by assigning scores of 1 through 9 on a 9-point hedonic scale, with 1 = dislike extremely, 5 = neither like nor dislike, and 9 = like extremely. All evaluations were conducted within 1 h after removing samples from storage.

Statistical analysis

All experiments were replicated three times, using different lots of produce for each experiment. Mean values were analyzed to determine significant differences ($P \leq 0.05$) in microbial populations detected in samples on each storage day as affected by treatment. Populations on produce subjected to a given treatment as affected by storage time were also analyzed for significant differences ($P \leq 0.05$). Significant differences in mean scores for each sensory attribute as affected by treatment and storage time were likewise determined. Data were subjected to analysis of variance and Duncan multiple range tests (SAS Institute, Cary, NC).

RESULTS AND DISCUSSION

Microbiological quality

Populations of mesophilic aerobic microorganisms (total counts) recovered from untreated and treated fresh-cut iceberg lettuce, Romaine lettuce, mesclun lettuce, and diced tomatoes are shown in Table 1. Populations on untreated produce ranged from 3.85 log CFU/g on diced tomatoes to 6.08 log CFU/g on mesclun lettuce. These counts are in line with those reported by others for untreated fresh-cut lettuce (*1, 4, 6, 14*). Treatment with water did not significantly reduce ($P > 0.05$) total counts on the test produce. Maximum reductions caused by treatment of lettuce with 0 – 200 µg/ml chlorine ranged from 0.69 log CFU/g (Romaine lettuce) to 1.65 log CFU/g (mesclun lettuce). Similar reductions in mesophilic aerobic plate counts on fresh-cut lettuce upon treatment with chlorinated water have been reported (*2, 9*). None of the treatments significantly reduced ($P > 0.05$) total counts on diced tomatoes. This is in agreement with observations made by Weissinger et al. (*15*) on the general ineffectiveness of chlorine as a sanitizer for diced tomatoes.

Considering all four types of produce and comparing populations of mesophilic aerobic microorganisms recovered on a given storage day after treatment with the same concentration of chlorine (50, 100, or 200 µg/ml) achieved using either NaOCl or $Ca(OCl)_2$ (57 produce/chlorine concentration/storage time comparisons), in only twelve test combinations (21.1%) were there significant differences ($P \leq 0.05$) (Table 1). In nine of these combinations, significantly lower populations were detected in produce treated with NaOCl compared to produce treated with the same concentration of Ca(OCl). In three cases, significantly lower populations were detected in produce treated with $Ca(OCl)_2$ compared to produce treated with NaOCl. These differences were not associated with a specific hypochlorite treatment concentration, storage time, or type of produce. Counts increased significantly ($P \leq 0.05$) on lettuce and tomatoes throughout storage at 4°C for 13 or 10 days, respectively. Results do not support the hypothesis that lethality of chlorine to mesophilic aerobic microorganisms naturally occurring on produce is influenced by the type of hypochlorite salt, i.e., NaOCl versus $Ca(OCl)_2$, used to achieve the same concentration of free chlorine.

Shown in Table 2 are populations of yeasts and molds recovered from untreated and treated fresh-cut iceberg lettuce, Romaine lettuce, mesclun lettuce, and diced tomatoes. Counts on untreated lettuce ranged from 3.77 log CFU/g (iceberg lettuce) to 5.12 log CFU/g (Romaine lettuce), which are somewhat higher than counts reported by Rodgers et al. (*12*) on green leaf lettuce. Lower populations (2.70 log CFU/g) were detected in untreated diced tomatoes.

As with observations on total counts, treatment of test produce with water did not significantly ($P > 0.05$) reduce the number of yeasts and molds. Treatment of the three types of lettuce with 200 µg/ml chlorine reduced yeast and mold populations by up to 0.26 – 0.81 log CFU/g. The maximum reduction on diced tomatoes resulting from treatment with chlorine was 0.63 log CFU/g, regardless of the concentration of chlorine or type of hypochlorite salt in treatment solutions. Populations recovered immediately after treatment with chlorinated water were not significantly less than those detected on untreated diced tomatoes.

Considering all four types of produce and comparing the number of yeasts/molds recovered on a given storage day after treatment with the same concentration of chlorine (50, 100, or 200 µg/ml) achieved using either NaOCl or $Ca(OCl)_2$ (57 produce/chlorine concentration/storage time comparisons), in only nine test combinations (15.8%) were there significantly differences ($P \leq 0.05$) in yeast/mold counts. In six of these combinations, significantly lower populations were detected in produce treated with NaOCl compared to produce treated with the same concentration of $Ca(OCl)_2$; in three combinations, significantly lower populations were detected in produce treated with $Ca(OCl)_2$ compared to produce treated with NaOCl. As with observations on total counts, significant differences in yeast and mold populations were not associated with a specific hypochlorite treatment concentration, storage time, or type of produce. Yeast and mold counts ($P \leq 0.05$) significantly increased throughout storage, regardless of initial treatment.

Sensory quality

The appearance, color, aroma, texture, and overall quality ratings for fresh-cut iceberg lettuce, fresh-cut Romaine lettuce, and mesclun lettuce washed with water (control) or 50, 100, or 200 µg/ml chlorine and stored for up to 13 days at 4°C were determined. Considering individual sensory ratings for all four types of produce on a given storage day after treatment with the same concentration of chlorine (50, 100, or 200 µg/ml) achieved using either NaOCl or $Ca(OCl)_2$ (285 sensory attribute/produce/chlorine concentration/storage time comparisons), in only five test combinations (1.75%) were there significantly different ($P \leq 0.05$) ratings (data not shown). Two of these test combinations involved mesclun lettuce and three combinations involved diced tomato. These differences were not correlated with type or concentration of hypochlorite in treatment solutions or with storage time and thus do not provide evidence to conclude that the source of chlorine, i.e., NaOCl versus $Ca(OCl)_2$, in treatment solutions had an impact on preserving sensory quality of these produce. There is clearly no evidence to indicate that the type of hypochlorite salt used to prepare treatment solutions affects the quality of iceberg lettuce or Romaine lettuce. The calcium concentration in treatment solutions containing $Ca(OCl)_2$ was

TABLE 2. Populations of yeasts and molds on fresh-cut lettuce and diced tomatoes as affected by treatment and storage time

Produce	Treatment	Chlorine conc. (μg/ml)	Population (log CFU/g)[1] 0 day	3	6	10	13
Iceberg lettuce	None		A 3.77				
	Water	0	AB 3.58 D	A 5.12 C	A 6.14 B	ABC 7.18 A	A 7.39 A
	NaOCl	50	A 3.89 D	AB 4.85 C	A 6.14 B	A 7.39 A	A 7.34 A
		100	BC 3.20 D	ABC 4.81 C	A 6.34 B	BCD 6.90 B	A 7.52 A
		200	C 3.01 D	C 4.23 C	A 6.14 B	AB 7.31 A	A 7.55 A
	$Ca(OCl)_2$	50	ABC 3.44 D	BC 4.29 C	A 5.95 B	D 6.66 A	B 6.92 A
		100	ABC 3.52 E	A 5.04 D	A 6.10 C	CD 6.73 B	A 7.49 A
		200	ABC 3.51 D	ABC 4.76 C	A 6.14 B	ABCD 7.08 A	AB 7.22 A
Romaine lettuce	None		AB 5.12				
	Water	0	A 5.35 C	A 6.46 B	A 7.29 A	AB 7.34 A	C 7.17 A
	NaOCl	50	ABC 4.96 D	AB 6.13 C	BC 6.80 B	AB 7.40 A	AB 7.52 A
		100	D 4.40 D	C 5.60 C	D 6.36 B	AB 7.05 A	BC 7.29 A
		200	D 4.43 D	BC 5.84 C	ABC 6.97 B	B 6.91 B	A 7.70 A
	$Ca(OCl)_2$	50	BCD 4.73 D	AB 6.12 C	CD 6.70 B	AB 7.24 A	BC 7.38 A
		100	CD 4.63 C	A 6.44 B	AB 7.17 A	AB 6.98 A	C 7.12 A
		200	CD 4.66 C	AB 6.25 B	AB 7.13 A	AB 7.21 A	BC 7.28 A
Mesclun lettuce	None		AB 4.38				
	Water	0	ABC 4.22 D	AB 5.47 C	AB 6.27 B	A 7.15 A	A 7.35 A
	NaOCl	50	BCD 4.00 E	AB 5.53 D	AB 6.35 C	A 7.02 B	A 7.34 A
		100	CDE 3.01D	B 5.06 C	ABC 6.18 B	A 7.01 A	A 7.08 A
		200	DE 3.79D	B 5.11 C	BC 5.99 B	AB 6.91 A	A 7.22 A
	$Ca(OCl)_2$	5	BCD 4.04 D	AB 5.37 C	A 6.51 B	A 7.00 AB	A 7.36 A
		100	A 4.47 C	AB 5.49 B	C 5.87 B	AB 6.75 A	A 7.22 A
		200	E 3.57 D	A 5.69 C	ABC 6.16 B	B 6.38	A 7.15 A
Diced tomato	None		A 2.70				
	Water	0	A 2.20 C	B 2.85 BC	B 3.05 B	AB 4.63 A	
	NaOCl	50	A 2.64 B	B 2.94 B	B 2.99 B	A 5.12 A	
		100	A 2.07 C	B 2.95 B	AB 3.30 B	AB 4.78 A	
		200	A 2.74 C	B 2.98 BC	AB 3.40 B	B 4.26 A	
	$Ca(OCl)_2$	50	A 2.91 C	A 3.42 B	CA 3.74 B	AB 4.70 A	
		100	A 2.18 C	B 2.98 B	B 2.96 B	AB 4.51 A	
		200	A 2.81 B	B 2.88 B	B 2.85 B	B 4.26 A	

[1]Within the same type of produce, values in the same column that are not preceded by the same letter are significantly different ($P \leq 0.05$). Values in the same row that are not followed by the same letter are significantly different ($P \leq 0.05$).

apparently too low to cause a detectable effect on texture retention. In situations where chlorinated water is replenished with $Ca(OCl)_2$ and recycled, the increase in calcium concentration may have a measurable effect on shelf-life retention, but this possibility was not investigated in our study.

Various sensory ratings assigned to all test produce significantly ($P \leq 0.05$) decreased with storage time, as expected. Overall sensory ratings for iceberg lettuce and Romaine lettuce fell to less than 5 (5 = neither like nor dislike) within 6 and 10 days, respectively, regardless of initial treatment. Sensory ratings for mesclun lettuce and diced tomatoes remained close to or above 5 throughout storage for 13 and 10 days, respectively.

CONCLUSIONS

Results of this study show that the type of hypochlorite salt, i.e., NaOCl and $Ca(OCl)_2$, used to prepare wash solutions at chlorine concentrations used in the produce industry to sanitizer fresh-cut iceberg lettuce, fresh-cut Romaine lettuce, mesclun lettuce, and diced tomato does not significantly affect lethality to microflora naturally occurring on these produce. In addition, the type of hypochlorite salt used to prepare chlorinated treatment water does not affect the sensory quality of these produce during subsequent storage at 4°C. Increased concentrations of calcium in recycled wash water to which $Ca(OCl)_2$ has been added to replenish the free chlorine could possibly have a measurable effect on sensory quality of fresh-cut lettuce and diced tomatoes, but this was not determined. While NaOCl and $Ca(OCl)_2$, at concentrations evaluated in this study, were indistinguishable in terms of effects on microbiological and sensory quality of produce, the choice of hypochlorite salt to prepare chlorinated water should also consider factors such as cost of the salt, ease of control of desired concentration in the water, worker safety, and problems associated with disposal of treatment water after it has been used. The advantages of selecting one hypochlorite salt over the other must be decided and evaluated by informed personnel in each fresh-cut produce operation.

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Call for Abstracts

IAFP 2007

The Association's 94th Annual Meeting

July 8-11, 2007

Lake Buena Vista, Florida

General Information

1. Complete the Abstract Submission Form Online.
2. All presenters must register for the Annual Meeting and assume responsibility for their own transportation, lodging, and registration fees.
3. There is no limit on the number of abstracts individuals may submit. However, one of the authors must deliver the presentation.
4. Accepted abstracts will be published in the Program and Abstract Book. Editorial changes may be made to accepted abstracts at the discretion of the Program Committee.
5. Membership in the Association is not required for presenting a paper at IAFP 2007.

Presentation Format

1. Technical — Oral presentations will be scheduled with a maximum of 15 minutes, including a two to four-minute discussion. LCD projectors will be available and computers will be supplied by the convenors.
2. Poster — Freestanding boards will be provided for presenting posters. Poster presentation surface area is 48" high by 96" wide (121.9 cm × 243.8 cm). Handouts may be used, but audiovisual equipment will not be available. The presenter will be responsible for bringing pins and velcro.

   Note: The Program Committee reserves the right to make the final determination on which format will be used for each presentation.

Instructions for Preparing Abstracts

1. All abstracts must be written in English.
2. All abstracts must be approved and signed off by all authors before submission.
3. Title — The title should be short but descriptive. The first letter in each word in the title and should be capitalized.
4. Authors — List all authors using the following style: first name or initials followed by the surname.
5. Presenter Name and Title — List the full name and title of the person who will present the paper.
6. Presenter Address — List the name of the department, institution and full postal address (including zip/postal code and country).
7. Phone Number — List the phone number, including area, country, and city codes of the presenter.
8. Fax Number — List the fax number, including area, country, and city codes of the presenter.
9. E-mail — List the E-mail address for the presenter.
10. Format preferred — Check the box to indicate oral or poster format. The Program Committee reserves the right to make the final determination of presentation format.
11. Category — The categories are used by the Program Committee to organize the posters and technical sessions. Please check the box which best describes the category for which the abstract is suitable.
12. Developing Scientist Awards Competition — Check the box to indicate if the presenter is a student wishing to be considered in this competition. The student will make the initial submission, and IAFP will E-mail the abstract to the major professor, who will complete the submission process. For more information, see "Call for Entrants in the Developing Scientist Awards Competitions."
13. Abstract — Key the abstract into the web-based system. In addition, a double-spaced copy of the abstract, typed in 12-point font in MS Word, should be E-mailed to IAFP at the time of submission. Use no more than 300 words. Abstracts are most often rejected because of a failure to follow the instructions below.

In addition to following these instructions, authors should carefully review the sections on selection criteria and rejection reasons as well as the sample abstracts (available online) before submitting the abstract. Original research abstracts MUST be in the following format:

Introduction: State the reason for pursuing this work (2–3 sentences)

Purpose: State the purpose or objectives of the study (1–2 sentences)

Methods: State the methodology used in the study (2–3 sentences). The methods should be specific enough that researchers in the same or similar field would understand the basic experimental design or approach.

Results: Describe the results obtained in the study (2–3 sentences). NOTE: Specific results, with statistical analysis (if appropriate), MUST be provided. A statement of "results pending" or "to be discussed" is not acceptable and will be grounds to abstract rejection. Results should be summarized, do NOT use tables or figures. *Significance:* State the significance of the findings to food safety and/or public health (1–2 sentences) NOTE: Do not include reference citations in the Abstract. Please see sample abstracts for further guidance on abstract structure.

Education abstracts MUST present an improvement or innovation on a proven method in order to educate others (about a food protection related topic). There should be a way to measure the outcomes and substantiate the improvements and/or outcomes. If measured, the sample size should be sufficiently large to represent the intended population.

Abstract Submission

Abstracts submitted for IAFP 2007 will be evaluated for acceptance by the Program Committee. Please be sure to follow the instructions above carefully; failure to do so may result in rejection. Information in the abstract data must not have been previously published in a copyrighted journal.

Abstracts must be received no later than January 16, 2007. Completed abstract and information must be submitted online. Use the online submission form at www.foodprotection.org. In addition, a double-spaced copy of the abstract, typed in 12-point font in MS Word, should be E-mailed to IAFP at the time of submission. You will receive an E-mail confirming receipt of your submission.

Selection Criteria

1. Abstracts must be structured as described above.
2. Abstracts must report the results of original research pertinent to the subject matter. Papers should report the results of new, applied studies dealing with: (i) causes (e.g., microorganisms, chemicals, natural toxicants) and control of all forms of foodborne illness; (ii) causes (e.g., microorganisms, chemicals, insects, rodents) and control of food contamination and/or spoilage; (iii) food safety from farm-to-fork (including all sectors of the chain including production, processing, distribution, retail, and consumer phases); (iv) novel approaches for the tracking of foodborne pathogens or the study of pathogenesis and/or microbial ecology; (v) public health significance of foodborne disease, including outbreak investigation; (vi) non-microbiology food safety issues (food toxicology, allergens, chemical contaminants); (vii) advances in sanitation, quality control/assurance, and food safety systems; (viii) advances in laboratory methods; and (ix) food safety risk assessment. Papers may also report subject matter of an educational nature.
3. Research must be based on accepted scientific practices.
4. Research should not have been previously presented nor intended for presentation at another scientific meeting. Papers should not appear in print prior to the Annual Meeting.

Rejection Reasons

1. Abstract was not prepared according to the "Instructions for Preparing Abstracts." This includes abstracts that are too lengthy.
2. Abstract reports inappropriate or unacceptable subject matter.
3. Abstract is not based on accepted scientific or educational practices and/or the quality of the research or scientific/educational approach is inadequate.
4. Potential for the approach to be practically used to enhance food safety is not justified.
5. Work reported appears to be incomplete and/or data and statistical validity are not presented. Percentages alone are not acceptable unless sample sizes (both numbers of samples and sample weight or volume) are reported. Detection limits should be specified when stating that populations are below these limits. Indicating that data will only appear in the presentation without including them in the abstract is NOT acceptable.
6. Abstract was poorly written or prepared. This includes spelling and grammatical errors or improper English language usage.
7. Results have been presented/published previously.
8. Abstract was received after the deadline for submission.
9. Abstract contains information that is in violation of the International Association for Food Protection Policy on Commercialism.
10. Abstract subject is similar to other(s) submitted by same author. (The committee reserves the right to combine such abstracts.)
11. Abstracts that report research that is confirmatory of previous studies and/or lacks originality will be given low priority for acceptance.

Deadlines and Notification Dates

- Abstract Submission Deadline: January 16, 2007.
- Submission Confirmations: Within 48 hours of submission.
- Acceptance/Rejection Notification: February 28, 2007.

Contact Information

Questions regarding abstract submission can be directed to Tamara P. Ford, 515.276.3344 or 800.369.6337; E-mail: tford@foodprotection.org

Program Chairperson

Lee-Ann Jaykus
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E-mail: leeann_jaykus@ncsu.edu

Call for Entrants in the Developing Scientist Awards Competitions

Supported by the International Association for Food Protection Foundation

The International Association for Food Protection is pleased to announce the continuation of its program to encourage and recognize the work of students and recent graduates in the field of food safety research. Qualified individuals may enter either the oral or poster competition.

Purpose

1. To encourage students and recent graduates to present their original research at the Annual Meeting.
2. To foster professionalism in students and recent graduates through contact with peers and professional Members of the Association.
3. To encourage participation by students and recent graduates in the Association and the Annual Meeting.

Presentation Format

Oral Competition — The Developing Scientist Oral Awards Competition is open to graduate students (enrolled or recent graduates) from M.S. or Ph.D. programs or undergraduate students at accredited universities or colleges. Presentations are limited to 15 minutes, which includes two to four minutes for discussion.

Poster Competition — The Developing Scientist Poster Awards Competition is open to students (enrolled or recent graduates) from undergraduate or graduate programs at accredited universities or colleges. The presenter must be present to answer questions for a specified time (approximately two hours) during the assigned session. Specific requirements for presentations will be provided at a later date.

General Information

1. Competition entrants cannot have graduated more than a year prior to the deadline for submitting abstracts.
2. Accredited universities or colleges must deal with environmental, food or dairy sanitation, protection or safety research.
3. The work must represent original research completed and presented by the entrant.
4. Entrants may enter only one paper in either the oral or poster competition.
5. All entrants must register for the Annual Meeting and assume responsibility for their own transportation, lodging, and registration fees.
6. Acceptance of your abstract for presentation is independent of acceptance as a competition finalist. Competition entrants who are chosen as finalists will be notified of their status by the chairperson by April 30, 2007.
7. Entrants who are full time students, with accepted abstracts will receive a complimentary, one-year Student Membership with *JFP* Online.
8. In addition to adhering to the instruction in the "Call for Abstracts," competition entrants must check the box to indicate if the paper is to be presented by a student in this competition. A copy of the abstract will be E-mailed to the major professor for final approval.
9. You must also specify full-time student or part-time student.

Judging Criteria

A panel of judges will evaluate abstracts and presentations. Selection of up to ten finalists for each competition will be based on evaluations of the abstracts and the scientific quality of the work. All entrants will be advised of the results by April 30, 2007. Only competition finalists will be judged at the Annual Meeting and will be eligible for the awards.

Judging criteria will be based on the following:

1. Abstract – Clarity, comprehensiveness and conciseness.
2. Scientific Quality – Adequacy of experimental design (methodology, replication, controls), extent to which objectives were met, difficulty and thoroughness of research, validity of conclusions based upon data, technical merit and contribution to science.
3. Presentation – Organization (clarity of introduction, objectives, methods, results and conclusions), quality of visuals, quality and poise of presentation, answering questions, and knowledge of subject.

Finalists

Awards will be presented at the International Association for Food Protection Annual Meeting Awards Banquet to the top three presenters (first, second and third places) in both the oral and poster competitions. **All finalists are expected to be present at the banquet where the award winners will be announced and recognized.**

Awards

First Place – $500 and an engraved plaque
Second Place – $300 and a framed certificate
Third Place – $100 and a framed certificate

Award winners will receive a complimentary, one-year Membership including *Food Protection Trends, Journal of Food Protection,* and *JFP* Online.

Policy on Commercialism

for Annual Meeting Presentations

1. INTRODUCTION

No printed media, technical sessions, symposia, posters, seminars, short courses, and/or other related types of forums and discussions offered under the auspices of the International Association for Food Protection (hereafter referred to as to Association forums) are to be used as platforms for commercial sales or presentations by authors and/or presenters (hereafter referred to as authors) without the express permission of the staff or Executive Board. The Association enforces this policy in order to restrict commercialism in technical manuscripts, graphics, oral presentations, poster presentations, panel discussions, symposia papers, and all other type submissions and presentations (here-after referred to as submissions and presentations), so that scientific merit is not diluted by proprietary secrecy.

Excessive use of brand names, product names or logos, failure to substantiate performance claims, and failure to objectively discuss alternative methods, processes, and equipment are indicators of sales pitches. Restricting commercialism benefits both the authors and recipients of submissions and presentations.

This policy has been written to serve as the basis for identifying commercialism in submissions and presentations prepared for the Association forums.

2. TECHNICAL CONTENT OF SUBMISSIONS AND PRESENTATIONS

2.1 Original Work

The presentation of new technical information is to be encouraged. In addition to the commercialism evaluation, all submissions and presentations will be individually evaluated by the Program Committee chairperson, technical reviewers selected by the Program Committee chairperson, session convenor, and/or staff on the basis of originality before inclusion in the program.

2.2 Substantiating Data

Submissions and presentations should present technical conclusions derived from technical data. If products or services are described, all reported capabilities, features or benefits, and performance parameters must be substantiated by data or by an acceptable explanation as to why the data are unavailable (e.g., incomplete, not collected, etc.) and, if it will become available, when. The explanation for unavailable data will be considered by the Program Committee chairperson and/or technical reviewers selected by the Program Committee chairperson to ascertain if the presentation is acceptable without the data. Serious consideration should be given to withholding submissions and presentations until the data are available, as only those conclusions that might be reasonably drawn from the data may be presented. Claims of benefit and/or technical conclusions not supported by the presented data are prohibited.

2.3 Trade Names

Excessive use of brand names, product names, trade names, and/or trademarks is forbidden. A general guideline is to use proprietary names once and thereafter to use generic descriptors or neutral designations. Where this would make the submission or presentation significantly more difficult to understand, the Program Committee chairperson, technical reviewers selected by the Program Committee chairperson, session convenor, and/or staff, will judge whether the use of trade names, etc., is necessary and acceptable.

2.4 "Industry Practice" Statements

It may be useful to report the extent of application of technologies, products, or services; however, such statements should review the extent of application of all generically similar technologies, products, or services in the field. Specific commercial installations may be cited to the extent that their data are discussed in the submission or presentation.

2.5 Ranking

Although general comparisons of products and services are prohibited, specific generic comparisons that are substantiated by the reported data are allowed.

2.6 Proprietary Information (See also 2.2.)

Some information about products or services may not be publishable because it is proprietary to the author's agency or company or to the user. However, the scientific principles and validation of performance parameters must be described for such products or services. Conclusions and/or comparisons may be made only on the basis of reported data.

2.7 Capabilities

Discussion of corporate capabilities or experiences are prohibited unless they pertain to the specific presented data.

3. GRAPHICS

3.1 Purpose

Slides, photographs, videos, illustrations, art work, and any other type visual aids appearing with the printed text in submissions or used in presentations (hereafter referred to as graphics) should be included only to clarify technical points. Graphics which primarily promote a product or service will not be allowed. (See also 4.6.)

3.2 Source

Graphics should relate specifically to the technical presentation. General graphics regularly shown in, or intended for, sales presentations cannot be used.

3.3 Company Identification

Names or logos of agencies or companies supplying goods or services must not be the focal point of the slide. Names or logos may be shown on each slide so long as they are not distracting from the overall presentation.

3.4 Copies

Graphics that are not included in the preprint may be shown during the presentation only if they have been reviewed in advance by the Program Committee chairperson, session convenor, and/or staff, and have been determined to comply with this policy. Copies of these additional graphics must be available from the author on request by individual attendees. It is the responsibility of the session convenor to verify that all graphics to be shown have been cleared by Program Committee chairperson, session convenor, staff, or other reviewers designated by the Program Committee chairperson.

4. INTERPRETATION AND ENFORCEMENT

4.1 Distribution

This policy will be sent to all authors of submissions and presentations in the Association forums.

4.2 Assessment Process

Reviewers of submissions and presentations will accept only those that comply with this policy. Drafts of submissions and presentations will be reviewed for commercialism concurrently by both staff and technical reviewers selected by the Program Committee chairperson. All reviewer comments shall be sent to and coordinated by either the Program Committee chairperson or the designated staff. If any submissions are found to violate this policy, authors will be informed and invited to resubmit their materials in revised form before the designated deadline.

4.3 Author Awareness

In addition to receiving a printed copy of this policy, all authors presenting in a forum will be reminded of this policy by the Program Committee chairperson, their session convenor, or the staff, whichever is appropriate.

4.4 Monitoring

Session convenors are responsible for ensuring that presentations comply with this policy. If it is determined by the session convenor that a violation or violations have occurred or are occurring, he or she will publicly request that the author immediately discontinue any and all presentations (oral, visual, audio, etc.) and will notify the Program Committee chairperson and staff of the action taken.

4.5 Enforcement

While technical reviewers, session convenors, and/or staff may all check submissions and presentations for commercialism, ultimately it is the responsibility of the Program Committee chairperson to enforce this policy through the session convenors and staff.

4.6 Penalties

If the author of a submission or presentation violates this policy, the Program Committee chairperson will notify the author and the author's agency or company of the violation in writing. If an additional violation or violations occur after a written warning has been issued to an author and his agency or company, the Association reserves the right to ban the author and the author's agency or company from making presentations in the Association forums for a period of up to two (2) years following the violation or violations.

Call for Nominations 2007 Secretary

A representative from the education sector will be elected in March of 2007 to serve as IAFP Secretary for the year 2007–2008.

Send letters of nomination along with a biographical sketch to the Nominations Chairperson:

Larry R. Beuchat
University of Georgia
Center for Food Safety
1109 Experiment St.
Griffin, GA 30223-1797
Phone: 770.412.4740
Fax: 770.229.3216
E-mail: lbeuchat@uga.edu

The Secretary-Elect is determined by a majority of votes cast through a vote taken in March of 2007. Official Secretary duties begin at the conclusion of IAFP 2007. The elected Secretary serves as a Member of the Executive Board for a total of five years, succeeding to President, then serving as Past President.

For information regarding requirements of the position, contact David Tharp, Executive Director, at 800.369.6337 or 515.276.3344; Fax: 515.276.8655; E-mail: dtharp@foodprotection.org.

Nominations Close November 1, 2006

International Association for Food Protection®

Award Nominations

The International Association for Food Protection welcomes your nominations for our Association Awards. Nominate your colleagues for one of the Awards listed below. You do not have to be an IAFP Member to nominate a deserving professional. To request nomination criteria, contact:

International Association for Food Protection
6200 Aurora Ave., Suite 200W
Des Moines, Iowa 50322-2864, USA
Phone: 800.369.6337; 515.276.3344
Fax: 515.276.8655
Web site: www.foodprotection.org
E-mail: info@foodprotection.org

Nominations deadline is March 12, 2007.

You may make multiple nominations. All nominations must be received at the IAFP office by **March 12, 2007.**

- Persons nominated for individual awards must be current IAFP Members. Black Pearl Award nominees must be companies employing current IAFP Members. FPA Food Safety Award nominees do not have to be IAFP Members.
- Previous award winners are not eligible for the same award.
- Executive Board Members and Awards Committee Members are not eligible for nomination.
- Presentation of awards will be during the Awards Banquet at IAFP 2007 – the Association's 94th Annual Meeting in Lake Buena Vista, Florida on July 11, 2007.

Nominations will be accepted for the following Awards:

Black Pearl Award

Award Showcasing the Black Pearl, *Sponsored by Wilbur Feagan and F&H Food Equipment Company*

Presented in recognition of a company's outstanding commitment to, and achievement in, corporate excellence in food safety and quality.

Fellow Award

Distinguished Plaque

Presented to Member(s) who have contributed to IAFP and its Affiliates with distinction over an extended period of time.

Honorary Life Membership Award

Plaque and Lifetime Membership in IAFP

Presented to Member(s) for their dedication to the high ideals and objectives of IAFP and for their service to the Association.

Harry Haverland Citation Award

Plaque and $1,500 Honorarium, *Sponsored by Zep Manufacturing Co.*

Presented to an individual for many years of dedication and devotion to the Association ideals and its objectives.

Harold Barnum Industry Award

Plaque and $1,500 Honorarium, *Sponsored by Nasco International, Inc.*

Presented to an individual for dedication and exceptional service to IAFP, the public, and the food industry.

Educator Award

Plaque and $1,500 Honorarium, *Sponsored by Nelson-Jameson, Inc.*

Presented to an individual for dedicated and exceptional contributions to the profession of the Educator.

Sanitarian Award

Plaque and $1,500 Honorarium, *Sponsored by Ecolab Inc.*

Presented to an individual for dedicated and exceptional service to the profession of Sanitarian, serving the public and the food industry.

Maurice Weber Laboratorian Award

Plaque and $1,500 Honorarium, *Sponsored by Weber Scientific*

Presented to an individual for outstanding contributions in the laboratory, recognizing a commitment to the development of innovative and practical analytical approches in support of food safety.

International Leadership Award

Plaque, $1,500 Honorarium and Reimbursement to attend IAFP 2007, *Sponsored by Cargill, Inc.*

Presented to an individual for dedication to the high ideals and objectives of IAFP and for promotion of the mission of the Association in countries outside of the United States and Canada.

Food Safety Innovation Award

Plaque and $2,500 Honorarium, *Sponsored by 3M Microbiology*

Presented to a Member or organization for creating a new idea, practice or product that has had a positive impact on food safety, thus, improving public health and the quality of life.

FPA Food Safety Award

Plaque and $3,000 Honorarium, *Sponsored by Food Products Association*

This Award alternates between individuals and groups or organizations. In 2007, the award will be presented to a individual in recognition of a long history of outstanding contributions to food safety research and education.

NEW MEMBERS

AUSTRALIA

Sandy Hume
bioMérieux Australia New Zealand
Baulkham Hills, New South Wales

Alister J. Morison
Vaporex Pty Ltd.
Beecroft, New South Wales

Anthony Pavic
BAIADA Poultry
Baulkham Hills, New South Wales

BELIZE

Luciano Chi
University for International Cooperation
Orang Walk District

BRAZIL

Susete Lobo Saar De Almeida
Health Department of Rio Grande Do Sul State
Porto Alegre, RS

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Kongens Lyngby

Cisse Hedegaard Hansen
Danish Institute for Fisheries Research
Kongens Lyngby

FINLAND

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NEW MEMBERS

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EESS LLC
Tuscaloosa

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University of Arizona
Tucson

Enue E. Sicairos
University of Arizona
Tucson

Maria S. Yepiz
University of Arizona
Tucson

NEW MEMBERS

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Applied Biosystems
Foster City

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Columbia Food Laboratories
Anaheim

Jean-Francois Chauvet
Bio-Rad Laboratories
Hercules

Christophe Cordevant
Bio-Rad Laboratories
Hercules

Sandrine Gary
Bio-Rad Laboratories
Hercules

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CTI Foods–S&S
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Gainesville

Anita C. Wright
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Rita Brennan Olson
Massachusetts Department
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Malden

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NSF International
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Geoffrey L. Ottinger
Complete Automation
Lake Orion

MINNESOTA

Janelle Pressler
The Restaurant Co. (dba Perkins)
Lexington

Raj Rajagopal
3M
St. Paul

Jeremy Yarwood
3M
St. Paul

MISSOURI

Corey Balentine
bioMérieux, Inc.
Hazelwood

Barbara Fork
bioMérieux, Inc.
Hazelwood

Carla McKinney
bioMérieux, Inc.
Hazelwood

Maher Saleh
bioMérieux, Inc.
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Hazelwood

Matthew Vuylsteke
bioMérieux, Inc.
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NEW SILVER SUSTAINING MEMBER

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NEW SUSTAINING MEMBER

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UPDATES

Marie Latulippe Joins ILSI North America

Marie Latulippe joined ILSI North America as a senior project manager in August 2006. She will assume immediate responsibility for the Technical Committee on Food and Chemical Safety and the Technical Committee on Food Microbiology. Ms. Latulippe comes to ILSI North America from ENVIRON Corporation where she performed, reported on, and presented analyses on dietary assessment of foods, food ingredients, and contaminants. She also worked on generally recognized as safe (GRAS) determinations; new dietary ingredient notifications; safety evaluations of nutrients and functional ingredients; and evaluations of the health effects of environmental contaminants for litigation support.

Prior to ENVIRON, Ms. Latulippe worked as a clinical nutritionist with the University of Wisconsin Hospital, where she performed nutrition assessments and prepared hospital protocols for patient care. She received a BS in biology from Allegheny College and an MS in nutrition science from The Pennsylvania State University. She completed her dietetic internship at the University of Wisconsin Hospital and is a registered dietitian.

Silliker, Inc. Announces New Positions

Cathy Davidson was named director of the Silliker, Inc. Northeast Laboratory in Allentown, PA. Prior to joining Silliker, she served as a quality control manager for Bel / Kaukauna USA.

David Crownover was promoted to client service manager for the Silliker Food Science Center in South Holland, IL. A member of the food testing and consulting company for 10 years, he will serve as the primary contact for FSC clients, oversee business proposals, and supervise client service functions.

Dragoslav Pavlovic and Bill Lewis of Silliker, Inc. were certified as foundation auditors by the Professional Animal Auditor Certification Organization, Inc. PAACO, a collaboration of five professional organizations with extensive expertise on best management practices and current science in animal agriculture, promotes the humane treatment of animals through education and certification of animal auditors. Currently, only six individuals in North America have been certified as PAACO foundation auditors.

Silliker Group Corp. announced the hiring of Dr. Mathew Lau as general manager of Singapore and Southeast Asia Operations. He is responsible for recruiting staff and managing all aspects of business operations, including customer relationships, financial performance, government relations, and strategic planning. Prior to joining Silliker, Dr. Lau served as lead researcher at the Nanyang Polytechnic's Applied Research Group in Singapore.

FKI Logistex Appoints Managing Director for European Operations

FKI Logistex® announces the appointment of Jerry Woodhouse as managing director, European operations.

In this newly created role, Mr. Woodhouse will be responsible for increasing the focus on the organizational and operational development of the company's rapidly growing European business activities. An MBA graduate engineer, Mr. Woodhouse brings in-depth experience to this key position in advanced electromechanical systems, contracting and turnkey projects across Europe and North America.

Prior to joining FKI Logistex, Mr. Woodhouse spent ten years with ITT, where he led a number of business development programs directed at organic and inorganic business growth in an integrated matrix-based organizational environment. During his earlier career, he worked for other high-profile organizations, including GEC Telecommunications, Bovis Construction, and Cegelec Environmental.

Novazone Inc. Appoints Michael Weber Vice President of Engineering

Novazone Inc., has announced the appointment of Michael Weber as vice president of engineering. In his position, Mr. Weber will lead Novazone's research and development efforts and report to Paul White, president and CEO of Novazone, Inc.

Mr. Weber brings more than 20 years of engineering, technical and management experience to Novazone. During his career he has held numerous senior level positions, developed and introduced new product lines, built high performance teams, and has received ten US patents in process control and instrumentation.

Prior to joining Novazone, Mr. Weber was vice president of engineering for Nanometrics, a semiconductor equipment company. Previously, Mr. Weber held key executive level positions at KLA-Tencor and Sensys Instruments. He holds a master's in physics from University Bremen, Germany.

International Association for Food Protection® NEWS

USDA Celebrates 100 Years of Food Safety

The US Department of Agriculture's Food Safety and Inspection Service (FSIS) celebrated 100 years of protecting consumers by commemorating the Centennial Anniversary of the signing of the Federal Meat Inspection Act (FMIA) on June 28, 2006.

"Today, we commemorate the centennial of President Theodore Roosevelt's signing of the historic legislation that significantly improved the safety of our nation's food supply. As we stand on the threshold of the second century of ensuring the safety of America's meat, poultry and egg products, we take pride in our achievements in public health protection and look forward to strengthening our commitment to safeguarding future generations," said Agriculture Deputy Secretary Chuck Conner.

On June 30, 1906, President Theodore Roosevelt signed the FMIA into law, requiring that meat products be inspected and that federally inspected slaughterhouses and processing plants operate under sanitary conditions.

"In 1906, early childhood mortality in America was high from maladies now largely overcome and rare because of laws like the FMIA. By incorporating science to an unprecedented degree, we are more effectively anticipating and eliminating threats to public health today and in the future," said under Secretary for Food Safety Dr. Richard Raymond.

Conner and Raymond participated in a ceremony held on the patio of USDA's Jamie Whitten Federal Building, which also featured remarks by FSIS Administrator Dr. Barbara Masters and Anthony Arthur, author of a recently released biography of Upton Sinclair, whose book *The Jungle* is credited with spurring passage of the FMIA. A certificate of appreciation was also presented to the grandson of former Indiana Senator Albert J. Beveridge, the co-author and chief senate sponsor of the legislation that became the FMIA.

Today, more than 7,600 FSIS inspection program personnel are assigned to about 6,000 federally inspected meat, poultry and egg products facilities in the United States to ensure products are safe, wholesome and accurately labeled. FSIS also inspects each shipment of imported meat and poultry from qualified countries to ensure US food safety requirements are met.

FSIS incorporates the results of more than 90,000 microbiological tests annually for *E. coli* O157:H7, *Salmonella* and *Listeria monocytogenes* to further the goal of preventing contamination and protecting public health. The Centers for Disease Control and Prevention has attributed significant declines in rates of illness from foodborne pathogens to the implementation of FSIS food safety regulations.

The centennial celebration featured a documentary video chronicling the history of meat inspection and food safety. The video incorporated historic photographs and artifacts, as well as footage from the Johnson and Eisenhower administrations, in telling the colorful and historically significant history of US meat inspection and food safety from 1906 through the present day.

FSIS has also honored the centennial anniversary of the FMIA with a web page dedicated to the people and complex history of inspection. The people, the policies and the evolution of FSIS' authorities, and its relationship to other agencies within USDA are detailed in an entertaining format. The web page can be found at: http://www.fsis.usda.gov/About_FSIS/100_Years/.

USDA Announces New BSE Surveillance Program

Agriculture Secretary Mike Johanns announced July 20, 2006 that the US Department of Agriculture will soon begin transitioning to an ongoing Bovine Spongiform Encephalopathy (BSE) surveillance program that corresponds to the extremely low prevalence of the disease in the United States.

"It's time that our surveillance efforts reflect what we now know is a very, very low level of BSE in the United States. This ongoing surveillance program will maintain our ability to detect BSE, provide assurance that our interlocking safeguards are successfully preventing BSE, while continuing to exceed science-based international guidelines," said Johanns.

The ongoing BSE surveillance program will sample approximately 40,000 animals each year. Under the program, USDA will continue to collect samples from a variety of sites and from the cattle populations where the disease is most likely to be detected, similar to the enhanced surveillance program procedures.

The new program will not only comply with the science-based international guidelines set forth by the World Animal Health organization (OIE), it will provide testing at a level ten times higher than the OIE recommended level.

USDA has an obligation to provide 30 days notice of the change to contractors who are performing the sampling and testing, so the earliest the new surveillance program would begin is late August. Once the ongoing surveillance program begins, USDA will periodically analyze the surveillance strategy to ensure the program provides the foundation for market confidence in the safety of US cattle.

In April, USDA released an analysis of 7 years of BSE surveillance data. This included data from an enhanced surveillance program, which began in June 2004, as a one-time effort to determine the prevalence of BSE in the United States. The analysis concluded that the prevalence of BSE in the United States is less than 1 case per million adult cattle. The analysis further revealed that the most likely number of cases is between 4 and 7 infected animals out of 42 million adult cattle. The analysis was submitted to a peer-review process and a panel of outside experts affirmed the conclusions.

The enhanced surveillance program has been funded using emergency CCC funds totaling $157.8 million since June 2004. Ongoing surveillance will cost approximately $17 million per year using funds appropriated by Congress. The President's FY 2007 budget request includes this level of funding.

BSE surveillance is not a food safety program. Human and animal health is protected by a system of interlocking safeguards, including the removal of specified risk materials — those tissues that studies have demonstrated may contain the BSE agent in infected cattle, along with the US Food and Drug Administration's 1997 ruminant to ruminant feed ban. Scientific studies indicate that the longer a feed ban is in place, the lower the prevalence of BSE will become.

An outline of the ongoing BSE surveillance plan is available at http://www.aphis.usda.gov/newsroom/hot_issues/bse.shtml.

Radiation-killed Bacteria Vaccine Induces Broad Immune Response in Mice

NIH/National Institute of Allergy and Infectious Diseases Vaccines made with bacteria killed by gamma irradiation, rather than by standard methods of heat or chemical inactivation, may be more effective, say researchers supported by the National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institutes of Health (NIH). Vaccines made from gamma-irradiated bacteria also may not need to be kept cold; an advantage in settings where refrigerating vaccines is impractical or impossible. A report on the research appears in the current issue of the journal *Immunity*.

In experiments with mice, scientists including Eyal Raz, M.D., Sandip Datta, M.D., and Joshua Fierer, M.D., of the University of California, San Diego, School of Medicine demonstrated that a vaccine made from irradiated *Listeria monocytogenes* bacteria, unlike a vaccine made from heat-killed bacteria, provides protection against challenge with live *Listeria*. The irradiated bacteria also stimulated a protective response from immune system cells called T cells. Previously, only vaccines made from live, weakened *Listeria* bacteria were believed capable of eliciting a T-cell response.

"This advance is potentially of great importance in meeting the challenge of creating vaccines that are safe, effective and simple to manufacture and transport," says NIH Director Elias A. Zerhouni, M.D.

Ideally, vaccines should stimulate a strong response not only from both arms of the adaptive immune system (antibodies and T cells), but also the body's innate immune system. However, traditional ways of making vaccines—either by killing disease-causing agents with heat, chemicals or by weakening (attenuating) live pathogens—have characteristic shortcomings. For example, heat- and chemical-killed vaccines, while safe and relatively easy to produce, generally produce a less broad immune response than live, attenuated vaccines. Conversely, it can be difficult to create live, attenuated vaccines that safely preserve the pathogen's ability to trigger strong innate and adaptive immune responses.

"By showing that whole, irradiated bacteria can form the basis of a vaccine that elicits a strong response from both arms of the adaptive immune system, Dr. Raz and his colleagues have opened the possibility of making a variety of bacterial vaccines that combine the best features of both killed-agent and live, attenuated vaccines," says NIAID Director Anthony S. Fauci, M.D.

Earlier research in Dr. Raz's laboratory had shown that irradiated probiotics (bacteria that are beneficial to health) retain the ability

to trigger innate immune system responses via proteins called toll-like-receptors. Based on that observation, says Dr. Raz, "we hypothesized that a vaccine made from whole, irradiated bacteria would retain the properties needed to evoke a broad immune response and result in a superior vaccine compared with other methods of killing the pathogen."

The investigators inactivated *Listeria* with lethal doses of gamma radiation and then vaccinated a group of 10 mice twice with the irradiated bacteria. Another group of 10 mice received two inoculations with heat-killed *Listeria*, while a third group of 10 received no vaccine. Twenty-eight days after the first vaccinations, all the mice were infected with a large dose of live *Listeria* (four times the amount required to kill 50 percent of infected unvaccinated animals). All the unvaccinated mice and all the mice vaccinated with heat-killed *Listeria* died, but 80 percent of the mice vaccinated with the irradiated bacteria survived. Further experiments showed that protection conferred by irradiated *Listeria* bacteria lasted for at least 12 months, indicating that the vaccine promoted the development of a "memory" T cell response.

Consistent with their earlier experiments with irradiated probiotics, Dr. Raz and his colleagues also found that irradiated *Listeria* retained the ability to stimulate innate immune responses via toll-like-receptor proteins. "Although completely inactivated by the radiation, and thus unable to cause illness, irradiated bacterial pathogens evidently retain characteristics that prompt the immune system to mount a full-fledged defense," says Dr. Datta, the study's lead author. "In this respect, irradiated pathogens more closely mimic the body's response to a live, attenuated vaccine."

Finally, the scientists found that mice could be protected by vaccination with irradiated *Listeria* that had been freeze-dried into a powder. This point is potentially of great practical importance, notes Dr. Raz. A serious drawback of live, attenuated vaccines is that they must be kept refrigerated at all times: if the "cold chain" is broken, the vaccine is liable to spoil and become useless. In countries with reliable electricity, maintaining the cold chain is rarely a problem. The same is not true in less developed countries. Vaccines made from whole, irradiated bacteria, freeze-dried into an easy-to-transport powder, could be reconstituted just before use, explains Dr. Raz, thereby eliminating the cold chain requirement.

It is also possible that a strategy based on irradiation-inactivated whole pathogens could rapidly yield vaccines against such bacterial diseases as typhoid, cholera, tuberculosis and other diseases of public health concern, such as intestinal parasites. This strategy might also be deployed in the event of epidemic outbreaks or against bioterrorist attacks, says Dr. Raz. Check the NIAID Web site at http://www.niaid.nih.gov.

Making Fresh-cut Apples Convenient and Safe

A new wash treatment developed by Agricultural Research Service (ARS) scientists provides antibrowning as well as antimicrobial benefits to fresh-cut apples.

Microbiologist Arvind Bhagwat led the project. He worked with plant physiologist Robert Saftner and horticulturist Judith Abbott. They are with the ARS Produce Quality and Safety Laboratory (PQSL) in Beltsville, MD.

Thanks to ARS research, managers at schools, grocery stores and restaurants nationwide have already been providing customers with sliced apples that stay fresh for several weeks. This ARS team now has discovered a dip solution—PQSL 2.0—that keeps sliced apples fresh and controls pathogens.

Volunteer sensory panelists tasted four slices of Fuji and four slices of Granny Smith apples. Each slice had been dipped that day in one of four different commercial or ARS wash treatments including PQSL 2.0. The panelists then reported any differences detected in aroma and flavor. All four treatments were found to maintain the apple slices' cut-surface color, firmness, aroma and flavor similarly.

In a separate test, the researchers exposed five pathogens to fresh batches of each of the same four antibrowning wash treatments for two hours. Formula PQSL 2.0 reduced levels of all five pathogens in the wash solutions by 99.999 percent. PQSL 2.0 also came out ahead in reducing microflora on sanitized apples after slicing. Such native bacterial and fungal populations can accelerate spoilage over time.

Further preliminary studies have shown that a newer version of PQSL 2.0 controlled, or eliminated, two pathogens on apple slices. Low doses of *Listeria* and *Salmonella* had been put directly onto apple slices along with the new formula, and the pathogens were found to be inhibited, or completely eliminated, after one, two and three weeks.

Read more about this research in the July 2006 issue of *Agricultural Research* magazine.

CAST Issue Paper Examines Safety of Consuming Foods from Animals Fed Biotechnology-derived Crop

The Council for Agricultural Science and Technology (CAST) is releasing a new Issue Paper, Safety of Meat, Milk, and Eggs from Animals Fed Crops Derived from Modern Biotechnology, fifth in CAST's nine-part series "Animal Agriculture's Future through Biotechnology."

"The safety and availability of high-quality food and animal feedstuffs are critical to populations worldwide," says Task Force Chair Professor Richard H. Phipps, School of Agriculture, Development and Policy, The University of Reading, Reading, United Kingdom. "During the last decade the area of biotechnology-derived crops has increased dramatically from 4 to 90 million hectares/ year, and crop varieties of corn, soybean, cotton, and canola are now widely used and are an important feedstuff in livestock production systems. It is essential, therefore, to consider the safety of meat, milk, and eggs obtained from animals fed crops derived from modern biotechnology."

Written and evaluated by a Task Force of international scientists from the United Kingdom, Germany, the United States, and Brazil, this timely CAST Issue Paper has the following objectives:

1. To provide an overview of regulatory assessments of biotechnology-derived crops; and
2. To summarize the empirical data generated for assessing the safety of meat, milk, and eggs from animals fed biotechnology-derived crops that express agronomic input traits.

Animal products such as milk, meat, and eggs are significant sources of high-quality food for humans and represent approximately one-sixth of their food energy and one-third of their food protein on a global basis. Therefore, an important underlying tenet for the scientific assessment of the safety and nutritive value of crops derived from modern biotechnology is based on the question, "Is the biotechnology-derived crop as safe as a conventional crop?" Safety of Meat, Milk, and Eggs from Animals Fed Crops Derived from Modern Biotechnology provides evidence to support a strong affirmative response.

Areas of study in CAST's new Issue Paper include an overview of regulatory assessments for biotechnology-derived crops modified for agronomic input traits, an evaluation of the comparative safety assessment process, results of feeding studies in farm animals, the fate of consumed proteins and DNA, and conclusions and recommendations.

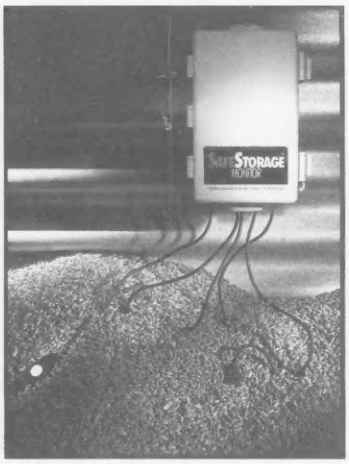
"Results of the most up-to-date research compiled by this international Task Force conclude that meat, milk, and eggs produced by farm animals fed biotechnology-derived crops are as wholesome, safe, and nutritious as similar products produced by animals fed conventional crops," says Dr. John M. Bonner, CAST executive vice president. "CAST is pleased to provide this important contribution to the scientific literature on feed safety."

CAST's new Issue Paper concludes with several important points for future research and action to ensure continued safety and nutritive value of feeds in current and future crops derived from modern biotechnology. Recommendations include:

- Continue using a case-by-case safety assessment approach
- Assess risks, as opposed to hazards
- Provide adequate funding to regulatory groups
- Provide resources to increase public outreach and dialogue

The full text of the paper Safety of Meat, Milk, and Eggs from Animals Fed Crops Derived from Modern Biotechnology (Issue Paper No. 34) may be accessed on the CAST Web site at www.cast-science.org.

INDUSTRY PRODUCTS



Decagon Devices, Inc.

Decagon Devices Introduces SafeStorage Monitor for Long-term Monitoring of Temperature and Water Activity (or Relative Humidity)

Decagon Devices, Inc. announces the release of their new SafeStorage Monitor. The SafeStorage allows you to sample water activity and temperature over time, making it possible to know exactly when conditions become unsafe. This monitor allows customers to continuously monitor conditions in packaging, storage bins, siloes, warehouses, or anywhere else you need to continuously monitor water activity or temperature.

Monitoring water activity during shipments can reduce or eliminate the chance of expensive, nasty surprises. Testing different types of packaging materials under actual shipping and storage conditions allows customers to choose adequate packaging, saving them from costly over packaging and spoilage costs.

Based on Decagon's popular AquaLab water activity meter, the SafeStorage Monitor collects and stores data from up to five separate water activity/temperature sensors, and is enclosed in a sturdy, weatherproof case. The water activity probes (sensors) for the SafeStorage Monitor can be used in-package, in-silo, in-container, in-warehouse, in-museum, and numerous other applications. The data recorded from these probes is downloaded to a computer and monitored using Decagon's DataTrac software. DataTrac was built to be user friendly and flexible to customer needs.

In conjunction, Decagon also offers a SafeStorage Quick Check, for consumers who need a quick and easy way to instantaneously check the water activity reading and temperature of any water activity probe, without the data collection and storage capabilities.

The SafeStorage Monitor can be utilized for a multitude of applications. Examples include, but are not limited to, the following:

- For shelf-life studies using real time data
- Package performance analysis in storage
- Isotherm generation using resealable jars
- Monitors conditions to prevent powder caking and clumping
- Temperature change influence on product water activity
- Shipping container monitoring for safe conditions
- Grain bin monitoring for safe storage conditions
- Humidity monitoring in air-conditioned rooms with specific humidity requirements
- Smokehouse humidity monitoring

Decagon Devices, Inc.
800.755.2751
Pullman, WA
www.decagon.com

Labconco's New Refrigerated CentriVap® Benchtop Centrifugal Concentrator Cools Multiple Samples from -4°C and Heats to +100°C

The new Refrigerated Centri-Vap Benchtop Centrifugal Concentrator processes heat-sensitive samples such as RNA and other proteins that are subject to degradation by the heat supplied by friction. With the exclusive refrigeration feature, the new CentriVap cools samples to -4°C to protect them from the effects of heat.

If desired, a microprocessor-controlled 300-watt heater speeds evaporation with a constant amount of heat up to 100°C in one degree increments. The Quick-Start™ One Button Start up activates the rotor, heater, timer and vacuum pump. The memory stores up to 9 user-set programs. The Quick-Stop™ system stops the rotor and

vacuum pump and bleeds air into the chamber within seconds. An audible alarm signals completion of set point run time.

A variety of rotors is offered that hold as many as 148 small samples at once. A microtiter plate rotor holds two deep wells or four standard plates. The optional CentriZap™ Strobe Light allows samples to be viewed while spinning.

Labconco
800.821.5525
Kansas City, MO
www.labconco.com

Ecolab Introduces Antimicrobial Product That Helps Improve Safety of Ready-to-Eat Meats

Ecolab introduces Octa-Gone,™ the first fatty acid-based antimicrobial product on the market that reduces microbial contamination on ready-to-eat (RTE) meat and poultry products. The product has a proven 2 or greater log reduction of *Listeria monocytogenes*, a pathogen which can cause foodborne illness.

"Octa-Gone provides an extra layer of food safety protection for our customers," says John Tengwall, vice president of Food & Beverage at Ecolab. Octa-Gone utilizes a unique application point that applies the product at the last possible moment in the packaging process, virtually eliminating the possibility of post-treatment recontamination.

"It's effective against microbial pathogens without affecting the color, flavor or appearance of the RTE meat product, and it's approved as a processing aid by the USDA, therefore no additive labeling is required for processors. It's a revolutionary product that is going to change the way RTE manufacturers run their packaging lines," says Mr. Tengwell.

All raw meats are susceptible to bacteria and pathogens, which is why they are cooked before consumption. Ready-to-eat products, like deli and luncheon meats, are prepared at a processing plant and undergo a cooking step that kills any pathogens present. However, through the handling or transporting of the product to the final packaging area, the ready-to-eat meats are susceptible to recontamination. The key to Octa-Gone, according to Tengwall, is the timing of when it's applied. Octa-Gone is applied directly into packaging bags immediately before ready-to-eat meats are placed inside and sealed. The packaged and sealed product is then sent through a hot water shrink tunnel, tightening the package and spreading the Octa-Gone treatment over the entire surface of the RTE product.

Octa-Gone was also designed for ease of implementation. "When adopting the new Octa-Gone product into their plants, Ecolab customers gain access to the 24-hour, 7-day-a-week technical support and service that the company is known for in the food and beverage processing industry. We are excited to bring this innovation to consumers by assisting our customers through the entire process of implementation to application," explains Tengwall.

Octa-Gone is not for use to sanitize hard food contact surfaces such as tanks, lines, food processing equipment, or to treat microbial contamination in processing water, or on food packaging.

Ecolab Inc.
651.293.2233
St. Paul, MN
www.ecolab.com

Micropump Inc.

Micropump's Compact Micro Annular Gear Pumps Provide Precise, Pulseless Flow, Offering Both Low Pressure and High Performance Options

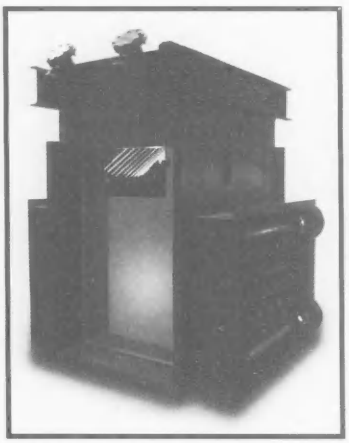
Micropump's micro annular gear pumps offer precise flow rate control for outstanding performance in a variety of applications. Offered in a Low Pressure (Series ML) or High Performance (Series MH) configuration, these compact, versatile pumps help conserve your valuable liquids and increase the overall efficiency of your system.

For maximum dosage accuracy, Series ML and MH pumps feature high-precision rotors that provide tight flow rate control, even at differential pressures as high as 80 bar (1,160 psi). These rotors allow the pumps to dispense volumes as small as 0.25 microliters and handle flow rates from 0.15 to 300 ml/min, with accuracies within +/- 1%. In addition, the pumps use gear tooth forming technology that keeps pulsations to a minimum to provide the smooth, constant flow necessary in applications such as analytical lab instruments, medical diagnostics, chemical processing, fuel cells, biotechnology, micro reaction technology, and other critical application processes.

Be sure to mention, "I read about it in *Food Protection Trends*"!

Measuring as small as 13 mm (0.51 inches) in diameter by 68 mm (2.67 inches) in length, Series ML and MH micro annular pumps are easily integrated into OEM equipment with small footprint, low weight, and short tubing length requirements.

Micropump Inc.
360.253.2008
Vancouver, WA
www.micropump.com



Bulkflow Technologies Ltd.

Bulkflow Technologies Introduces a New High Temperature Bulk Powder Cooling System with Innovative Tube Exchanger

Bulkflow Technologies Ltd. has introduced a new high temperature bulk powder cooling system with an innovative tube exchanger that minimizes thermal stresses and accommodates thermal expansion.

The new high temperature model cools bulk solids with temperatures up to 1832°F (1000°C). For these very high temperatures, Bulkflow developed a system using horizontal water-cooled tubes as the heat exchange surface. Bulk powder flows via gravity over the cooling tubes while indirectly cooled. The geometry of the tube is perfectly uniform with even temperatures throughout the tube wall to avoid hot spots and high local stresses.

Several industries process very high temperature bulk solids, such as pyrometallurgical processes for metal recovery, reactor discharges in the petrochemical industry and boiler in fluid bed combustion chambers.

The tubes are arranged in a serpentine design connected to manifolds at the top and bottom of each section. The tubes penetrate the front and back wall of the exchanger, with all welded connections outside of the product flow. The tubes are not welded to the front and back wall to allow full movement. A product seal where the tube penetrates the front and back wall prevents product leakage. The front and back wall is typically refractory lined on the inside (product side) to keep the temperature of the walls low minimizing thermal expansion.

The technology combines zero emissions, lower energy consumption and lower capital costs with exceptional results. Benefits include a gentle, improved product flow to prevent product attrition, prevention of potential caking in storage and slower degradation and speed time to packaging. Safe and compact, the system easily integrates on line to existing equipment.

For large capacities, the heat exchanger can be of modular construction with multiple banks mounted directly in series to achieve the full thermal duty. A combination unit with plate design is also optional for lower temperature.

Bulkflow Technologies Ltd.
866.379.3500
Calgary, Alberta, Canada
www.bulkflow.com

Biotrace International's TECRA Aller-tect™ is a Simple and Very Sensitive Swab Test for the Detection of Protein Residues

Checking for removal of protein residues after cleaning can quickly identify contamination. As the majority of allergens are proteins, if a surface is found to be protein-free, it is also free of those allergens.

TECRA Aller-tect has been validated for a range of allergens and approximate limits of detection for each have been determined.

Aller-tect requires little technical training and is ideal for use in a production facility. Simply swab, click, heat and read!

Sensitive results make this a reliable tool to include in any Allergen Management Plan and can be used in conjunction with the TECRA Allergen VIA kits (for testing specific allergens), for a complete allergen testing solution.

In addition to Allergen testing, Biotrace International offers a complete line of the products needed to check the safety and quality of food production processes; including rapid pathogen and toxin tests, products for environmental and carcass sampling, dilution and enrichment and ATP testing that gives a "real time" assessment of plant sanitation.

Biotrace International
800.729.7611
Bothell, WA
www.biotraceamericas.com

Be sure to mention, "I read about it in *Food Protection Trends*"!

Innovations Lead to Flowserve's Smallest Pump Ever – The Guardian 3000 is Flowserve's First Electronics Cooling Pump

Flowserve Corp. announces the release of the Flowserve Guardian 3000 electronics cooling pump. The Guardian 3000 is Flowserve's first production pump designed for use in cooling computer processors and graphics chips in high-end consumer personal computers.

Measuring approximately 90 mm (3.54 in) in length and 36 mm (1.42 in) in diameter, the Guardian 3000 is the smallest pump ever developed by Flowserve. While the largest pump ever built by Flowserve has an impeller diameter of 4.24 m (13.9 ft) and would fill an Olympic-size swimming pool in 25 seconds, the Guardian 3000 has an impeller diameter of less than an inch and would take nearly three minutes to fill a kitchen sink.

The Guardian 3000 addresses one of the most daunting challenges facing computer and processor manufacturers today – how to cool computer electronic components within limited dimensional, cost and power budgets. An overhung centrifugal, nonmetallic, magnetic-drive, seal-less pump, the Guardian 3000 uses patented motor technology and innovative design to achieve the small form factor necessary to fit microcomputer and other electronic package applications.

The Guardian 3000 is powered by an integral brushless 12-volt DC motor, and is designed for a minimum five-year maintenance-free life. Collaboratively designed and manufactured by members of the company's Memphis, TN; Vernon, CA; and Dayton, OH facilities, the unit has successfully completed tens of thousands of hours of endurance testing and more than 40,000 cycles of on/off tests.

Flowserve Corp.
800.728.PUMP
Dallas, TX
www.flowserve.com

BioTek Instruments Introduces the Synergy™ 2 Multi-Detection Microplate Reader

BioTek Instruments Inc. announced the launch of the Synergy™2 Multi-Detection Microplate Reader. Based on the popular Synergy™ HT, the Synergy 2 is a five-mode microplate reader designed for the life science research and drug discovery markets. This new detection system will provide researchers with an unprecedented level of cost-effectiveness, and a very high level of performance in a compact and modular instrument.

The Synergy 2 detection modes include Fluorescence Intensity, Fluorescence Polarization, Time-Resolved Fluorescence, Luminescence and UV-visible Absorbance. Synergy 2 uses a unique combination of monochromator, filters and dichroic mirrors that provide the best possible level of performance in all detection modes. Its three broad-spectrum light sources have been chosen for optimal illumination and excitation in all applications. The Synergy 2 is driven by the BioTek Instruments, Inc. new Gen5™ Reader Control and Data Analysis Software. Gen5 is the most modern microplate software available on the market.

When asked about the Synergy 2 Multi-Detection Microplate Reader, Gary Barush, director of sales and marketing at BioTek commented, "The Synergy 2 is the first of a new generation of multi-detection microplate readers that reflect the convergence of requirements associated with HTS/Drug Discovery and life science research. This instrument has been designed with screening applications in mind but has retained the need for greater flexibility found in life science research. Synergy 2 is fast, reads a 384-well plate in less than 30 seconds, is compatible with 1536-well plates, and provides high performance in fluorescence polarization and time-resolved modes, and at the same time comes equipped with precise temperature control, built-in shaking, monochromator based photometry and a reagent injection system for applications traditionally found in research laboratories."

With its modular architecture, the Synergy 2 can be customized for specific applications, making it an extremely cost-effective reader. The Synergy 2 runs all common microplate applications such as ELISA assays, 260 nm DNA quantification, reporter gene assays, cytotoxicity and cell proliferation assays, protein and nucleic acid quantification, kinetic enzyme assays, as well as ion channel assays, FRET and TR-FRET assays, binding assays and much more.

BioTek Instruments, Inc.
888.451.5171
Winooski, VT
www.biotek.com

COMING EVENTS

OCTOBER

- **3–4, Advancing Your HACCP Program: Integrating Process Controls with HACCP and Quality Control to Improve Profits,** University of Georgia, Athens, GA. For more information, contact Eve Mayes at ebmayes@uga.edu; or go to www.EFSonline.uga.edu/calendar.htm.
- **9–11, SQFI Food Safety Certification Conference,** Hyatt Hotel, Crystal City, VA. For more information, go to www.fmi.org.
- **9–13, Wisconsin Cheese Technology Short Course,** University of Wisconsin-Madison, Madison, WI. For more information, contact Dr. Bill Wendorff at 608.263.2015 or go to www.cdr.wisc.edu.
- **10–11, Associated Illinois Milk, Food and Environmental Sanitarians,** Stoney Creek Inn, East Peoria, IL. For more information, contact Steve DiVencenzo at 217.785.2439; E-mail: adivince@idph.state.il.us.
- **10–12, Prerequisites for Food Safety and Security,** The Atherton Hotel, State College, PA. For more information, call 814.865.8301; E-mail: shortcourse@psu.edu.
- **11, College of Agricultural Sciences Career and Internship Fair,** Colorado State University, Fort Collins, CO. For more information, contact Judi Blum at 970.491.3721; E-mail: judi.blum@colostate.edu.
- **11–13, 2006 Food Safety Supply Chain Conference,** Grand Hyatt Hotel, Washington, D.C. For more information, E-mail: jkendzel@fmi.org.
- **12–13, Preventing Allergen Cross-Contamination in Your Plant and Products,** Guelph Food Technology Centre, Guelph, Ontario, Canada. For more information, call 519.821.1246 or go to www.gftc.ca.
- **14–17, 26th Food Microbiology Symposium,** University of Wisconsin-River Falls, River Falls, WI. For more information, call 715.425.3704 or go to www.uwrf.edu/food-science.
- **18–19, Iowa Association for Food Protection Annual Meeting,** Quality Inn, Ames, IA. For more information, contact Phyllis Borer at 712.754.2511 ext. 33; E-mail: borerp@ampi.com.
- **25–26, Nano and Microtechnologies in the Food and Health Food Industries,** NH Grand Hotel Krasnapolsky, Amsterdam. For more information, call 44.(0)1786.447520; E-mail: carrie.smith@nano.org.uk.

NOVEMBER

- **1, Ohio Association of Food and Environmental Sanitarians,** Ohio Dept. of Agriculture, Reynoldsburg, OH. For more information, contact Gloria Swick-Brown at 614.466.7760; E-mail: gloria.swick-brown@odh.ohio.gov.
- **1–2, Sanitary Design for Equipment, Materials and Establishments,** Guelph Food Technology Centre, Guelph, Ontario, Canada. For more information, call 519.821.1246 or go to www.gftc.ca.
- **4–8, American Public Health Association's 134th Annual Meeting and Expo,** Boston, MA. For more information, call 202.777.APHA or go to www.apha.org.
- **6–8, Advanced Sanitation Workshop,** Randolph Associates, Inc., Raleigh, NC. For more information, call 205.595.6455 or E-mail HERConsult@aol.com.
- **6–8, The 4th World Mycotoxin Forum,** Hilton Cincinnati Netherland Plaza, Cincinnati, OH. For more information, call 31.30. 229 42 47; or go to www.bastiaanse-communication.com.
- **7–8, Cheese Grading and Evaluation Short Course,** University of Wisconsin-Madison, Madison, WI. For more information, contact Dr. Scott Rankin at 608.263.2008 or go to www.cdr.wisc.edu.
- **30–Dec. 1, IAFP's Second European Symposium on Food Safety, "Innovations in Food Safety Management,"** Fira Palace Hotel, Barcelona, Spain. For more information, contact IAFP at 800.369.6337; E-mail: info@foodprotection.org.

DECEMBER

- **4–8, Diploma in Food Hygiene and Safety,** Guelph Food Technology Centre, Guelph, Ontario, Canada. For more information, call 519.821.1246 or go to www.gftc.ca.

JANUARY

- **24–26, International Poultry Expo and International Feed Expo,** Georgia World Congress Center, Atlanta, GA. For more information, call 770.493.9401 or go to www.ipe07.org.

IAFP UPCOMING MEETINGS

JULY 8-11, 2007
Lake Buena Vista, Florida

AUGUST 3-6, 2008
Columbus, Ohio

JULY 12-15, 2009
Grapevine, Texas

Continued from page 700

Will the industry listen? Will the industry clean up its act and stop poisoning its customers? Will the industry put me out of business?

I am a trial lawyer who has built a practice on foodborne pathogens. Since the Jack in the Box *E. coli* outbreak in 1993, I have represented thousands of families who were devastated for doing what we do every day – eating food. This may prompt some readers to consider me a blood-sucking ambulance chaser who exploits other people's personal tragedies.

If that is the case, here is my plea:

Put me out of business, please.

For this trial lawyer, *E. coli* has been a far too successful practice — and a heart-breaking one. I am tired of visiting with horribly sick kids who did not have to be sick in the first place. I am outraged with a food industry that allows *E. coli* and other poisons to reach consumers. So, stop making kids sick and I will happily move on. Here is how:

- Stop using water that is contaminated with cattle and human feces to irrigate. Wash fresh fruits and vegetables.
- Provide workers in the fields and factories with adequate restroom and hand-washing facilities, and if they are ill with an infectious disease, do not let them work.

None of this will stop *E. coli* entirely, but these steps will help make our food supply safer.

And, with a little luck, it will force one damn trial lawyer to find another line of work.

William D. Marler is a Seattle trial lawyer who represents victims of foodborne illnesses, and the father of three daughters.

ADVERTISING INDEX

CAREER SERVICES SECTION

CAREER SERVICES SECTION

List your open positions in *Food Protection Trends*. Special rates for this section provide a cost-effective means for you to reach the leading professionals in the industry. Call today for rate information. Send your job ads to Donna Bahun at dbahun@foodprotection.org or to the Association office: 6200 Aurora Ave., Suite 200W, Des Moines, IA 50322-2864; Phone: 800.369.6337; 515.276.3344; Fax: 515.276.8655.

International Association for Food Protection®

IAFP Members

Did you know that you are eligible to place an advertisement if you are unemployed and looking for a new position? As a Member benefit, you may assist your search by running an advertisement touting your qualifications.

Walt Disney World® Resort

WDW Food Safety and Health Technical Manager

An opportunity is currently available with the WALT DISNEY WORLD CO. for a food safety professional interested in joining and contributing towards a progressive company and food safety system. You will be responsible for performing HACCP-based evaluations and assisting with overall food safety efforts for our theme parks & resorts and special events.

Requirements:

- Bachelor's degree in Food Microbiology, Food Science, Environmental Health or related field.
- Minimum of five years experience in the industry performing food safety evaluations of food service locations.
- Demonstrated in-depth knowledge of HACCP.
- Demonstrated knowledge of emerging pathogens and the most common contributing factors associated with foodborne illness.
- Established written, verbal, organizational skills and computer proficiency.
- Ability to work independently and within a team environment.
- Proven leadership experience in implementing and managing leading edge food safety and public health strategies.
- Demonstrated problem solving and decision-making skills.
- Demonstrated strong teaching and presentation skills.

Desired:

- Master's degree in Public Health, Food Microbiology.
- Registration or certification as an Environmental Health Specialist, Microbiologist, or Food Safety and Protection Professional is preferred.
- Practical experience in teaching food manager certification curriculums.

Qualified candidates should E-mail their resumes to Wdw.prof.recruiter@disney.com with 'food safety' in the subject line

EOE * Drawing Creativity from Diversity * Disney

Journal of Food Protection®

ISSN: [illegible]
Print Publication

International Association for Food Protection

Reg. U.S. Pat. Off.

Vol. 69 August 2006 No. 8

Research Notes

General Interest

* Asterisk indicates author for correspondence.

The Perfect Fit

Introducing the New IAFP Career Services

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Visit http://careers.foodprotection.org

Many job seekers and employers are discovering the advantages of shopping online for industry jobs and for qualified candidates to fill them. But the one-size-fits-all approach of the mega job boards may not be the best way to find what you're looking for. **IAFP Career Services** gives employers and job seeking professionals a better way to find one another and make that perfect career fit.

Employers: Tailor your recruiting to reach qualified food safety industry professionals quickly and easily. Search the database of resumes and proactively contact candidates, and get automatic email notification when a candidate matches your criteria.

Job Seekers: Get your resume noticed by the people in the industry who matter most: the food protection industry employers. Whether you're looking for a new job, or ready to take the next step in your career, we'll help you find the opportunity that suits you.

Visit http//careers.foodprotection.org today to post or search job listings in the food protection industry.

IAFP
Offers
"Guidelines for the Dairy Industry"
from
The Dairy Practices Council®

This newly expanded Five-volume set consists of 80 guidelines.

1 Planning Dairy Freestall Barns
2 Effective Installation, Cleaning, and Sanitizing of Milking Systems
3 Selected Personnel in Milk Sanitation
4 Installation, Cleaning, & Sanitizing of Large Parlor Milking Systems
5 Directory of Dairy Farm Building & Milking System Resource People
6 Natural Ventilation for Dairy Tie Stall Barns
7 Sampling Fluid Milk
8 Good Manufacturing Practices for Dairy Processing Plants
9 Fundamentals of Cleaning & Sanitizing Farm Milk Handling Equipment
10 Maintaining & Testing Fluid Milk Shelf-Life
11 Sediment Testing & Producing Clean Milk
12 Tunnel Ventilation for Dairy Tie Stall Barns
13 Environmental Air Control and Quality for Dairy Food Plants
14 Clean Room Technology
15 Milking Center Wastewater
16 Handling Dairy Products from Processing to Consumption
17 Prevention of & Testing for Added Water in Milk
18 Fieldperson's Guide to High Somatic Cell Counts
21 Raw Milk Quality Tests
22 Control of Antibacterial Drugs & Growth Inhibitors in Milk and Milk Products
23 Preventing Rancid Flavors in Milk
24 Troubleshooting High Bacteria Counts of Raw Milk
25 Cleaning & Sanitation Responsibilities for Bulk Pickup & Transport Tankers
27 Dairy Manure Management From Barn to Storage
28 Troubleshooting Residual Films on Dairy Farm Milk Handling Equipment
29 Cleaning & Sanitizing in Fluid Milk Processing Plants
30 Potable Water on Dairy Farms
31 Composition & Nutritive Value of Dairy Products
32 Fat Test Variations in Raw Milk
33 Brucellosis & Some Other Milkborne Diseases
34 Butterfat Determinations of Various Dairy Products
35 Dairy Plant Waste Management
36 Dairy Farm Inspection
37 Planning Dairy Stall Barns
38 Preventing Off-Flavors in Milk
39 Grade A Fluid Milk Plant Inspection
40 Controlling Fluid Milk Volume and Fat Losses
41 Milkrooms and Bulk Tank Installations
42 Stray Voltage on Dairy Farms
43 Farm Tank Calibrating and Checking
45 Gravity Flow Gutters for Manure Removal in Milking Barns
46 Dairy Odor Management
48 Cooling Milk on the Farm
49 Pre- & Postmilking Teat Disinfectants
50 Farm Bulk Milk Collection Procedures
51 Controlling the Accuracy of Electronic Testing Instruments for Milk Components
53 Vitamin Fortification of Fluid Milk Products
54 Selection of Elevated Milking Parlors
54S Construction Materials for Milking Parlors
56 Dairy Product Safety (Pathogenic Bacteria) for Fluid Milk and Frozen Dessert Plants
57 Dairy Plant Sanitation
58 Sizing Dairy Farm Water Heater Systems
59 Production and Regulation of Quality Dairy Goat Milk
60 Trouble Shooting Microbial Defects: Product Line Sampling & Hygiene Monitoring
61 Frozen Dessert Processing
62 Resources For Dairy Equipment Construction Evaluation
63 Controlling The Quality And Use Of Dairy Product Rework
64 Control Points for Good Management Practices on Dairy Farms
65 Installing & Operating Milk Precoolers Properly on Dairy Farms
66 Planning A Dairy Complex - "100+ Questions To Ask"
69 Abnormal Milk - Risk Reduction and HACCP
70 Design, Installation & Cleaning of Small Ruminant Milking Systems
71 Farmers Guide To Somatic Cell Counts In Sheep
72 Farmers Guide To Somatic Cell Counts In Goats
73 Layout of Dairy Milk Houses for Small Ruminant Operations
75 Direct Microscopic Exam of Milk from Small Ruminants (training CD)
78 Biosecurity for Sheep and Goat Dairies
80 Food Allergen Awareness In Dairy Plant Operations
83 Bottling Water in Fluid Milk Plants
85 Six Steps to Success - Production of Low SCC Milk (training CD)
90 On-Farm & Small-Scale Dairy Products Processing
91 HACCP - SSOP's and Prerequisites
92 HACCP - Principle Number One: Hazard Analysis
93 HACCP - Principles 2 & 3 Critical Control Points & Critical Limits
97 Direct Loading of Milk from Parlor into Bulk Tankers
100 Food Safety in Farmstead Cheesemaking
101 Farmers Guide To Somatic Cell Counts In Cattle
102 Effective Installation, Cleaning & Sanitizing of Tie Barn Milking Systems
103 Approving Milk and Milk Product Plants for Extended Runs
105 Sealing Bulk Milk Truck Tanks

IAFP has agreed with The Dairy Practices Council to distribute their guidelines. DPC is a non-profit organization of education, industry and regulatory personnel concerned with milk quality and sanitation throughout the United States. In addition, its membership roster lists individuals and organizations throughout the world.

For the past 37 years, DPC's primary mission has been the development and distribution of educational guidelines directed to proper and improved sanitation practices in the production, processing, and distribution of high quality milk and milk products.

The DPC Guidelines are written by professionals who comprise six permanent task forces. Prior to distribution, every guideline is submitted for approval to the state regulatory agencies in each member state. Should any official have an exception to a section of a proposed guideline, that exception is noted in the final document.

The guidelines are renown for their common sense and useful approach to proper and improved sanitation practices. We think they will be a valuable addition to your professional reference library.

If purchased individually, the entire set would cost $367.00. We are offering the set, packaged in five looseleaf binders for $265.00.

Information on how to receive new and updated guidelines will be included with your order.

To purchase this important source of information, complete the order form below and mail or fax (515-276-8655) to IAFP.

Please enclose $265 plus $17 shipping and handling for each set of guidelines within the U.S. Outside U.S., shipping will depend on existing rates. Payment in U.S. $ drawn on a U.S. bank or by credit card.

Name Phone No.

Company

Street Address

City, State/Province, Code

VISA/MC/AE No. Exp. Date

AUDIOVISUAL LIBRARY ORDER FORM

The use of the Audiovisual Library is a benefit for **Association Members only.** Limit your requests to five videos. Material from the Audiovisual Library can be checked out for 2 weeks only so that all Members can benefit from its use.

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Postal Code/Zip + 4 _____ Country _____

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PLEASE CHECK BOX NEXT TO YOUR VIDEO CHOICE

(Allow 4 weeks minimum from date of request.)

DAIRY

- ❒ D1010 The Bulk Milk Hauler: Protocol & Procedures
- ❒ D1030 Cold Hard Facts
- ❒ D1040 Ether Extraction Method for Determination of Raw Milk
- ❒ D1041 Dairy Plant
- ❒ D1050 Food Safety: Dairy Details
- ❒ D1060 Frozen Dairy Products
- ❒ D1070 The Gerber Butterfat Test
- ❒ D1080 High-Temperature, Short-Time Pasteurizer
- ❒ D1090 Managing Milking Quality
- ❒ D1100 Mastitis Prevention and Control
- ❒ D1105 Milk Hauling Training
- ❒ D1110 Milk Plant Sanitation: Chemical Solution
- ❒ D1120 Milk Processing Plant Inspection Procedures
- ❒ D1125 Ohio Bulk Milk Hauling Video
- ❒ D1130 Pasteurizer: Design and Regulation
- ❒ D1140 Pasteurizer: Operation
- ❒ D1150 Processing Fluid Milk
- ❒ D1170 3-A Symbol Council
- ❒ D1180 10 Points to Dairy Quality

ENVIRONMENTAL

- ❒ E2012 Better TEDs for Better Fisheries
- ❒ E3010 The ABC's of Clean – A Handwashing and Cleanliness Program for Early Childhood Programs
- ❒ E3020 Acceptable Risks?
- ❒ E3030 Air Pollution: Indoor
- ❒ E3041 Allergy Beware
- ❒ E3040 Asbestos Awareness
- ❒ E3050 Down in the Dumps
- ❒ E3055 Effective Handwashing – Preventing Cross-Contamination in the Food Service Industry
- ❒ E3060 EPA Test Methods for Freshwater Effluent Toxicity Tests (Using Ceriodaphnia)
- ❒ E3070 EPA Test Methods for Freshwater Toxicity Tests (Using Fathead Minnow Larva)
- ❒ E3075 EPA: This is Super Fund
- ❒ E3080 Fit to Drink
- ❒ E3090 Food-Service Disposables: Should I Feel Guilty
- ❒ E3110 Garbage: The Movie
- ❒ E3120 Global Warming: Hot Times Ahead
- ❒ E3125 Good Pest Exclusion Practices
- ❒ E3128 Integrated Pest Management (IPM)
- ❒ E3130 Kentucky Public Swimming Pool and Bathing Facilities
- ❒ E3131 Key Pests of the Food Industry
- ❒ E3133 Physical Pest Management Practices
- ❒ E3135 Plastics Recycling Today: A Growing Resource
- ❒ E3140 Putting Aside Pesticides
- ❒ E3150 Radon
- ❒ E3160 RCRA-Hazardous Waste
- ❒ E3161 The Kitchen Uncovered: Orkin Sanitized EMP. The New Superfund: What It Is and How It Works
- ❒ E3170 Tape 1 – Changes in the Remedial Process: Clean-up Standards and State Involvement Requirements
- ❒ E3180 Tape 2 – Changes in the Removal Process: Removal and Additional Program Requirements
- ❒ E3190 Tape 3 – Enforcement & Federal Facilities
- ❒ E3210 Tape 4 – Emergency Preparedness & Community Right-to-Know
- ❒ E3220 Tape 5 – Underground Storage Tank Trust Fund & Response Program
- ❒ E3230 Tape 6 – Research & Development/Closing Remarks
- ❒ E3235 Regulatory and Good Manufacturing Practices
- ❒ E3236 Rodent Control Strategies
- ❒ E3240 Sink a Germ
- ❒ E3245 Wash Your Hands
- ❒ E3250 Waste Not: Reducing Hazardous Waste
- ❒ E3251 Would Your Restaurant Kitchen Pass Inspection?
- ❒ E3260 Swabbing Techniques for Sampling the Environment and Equipment

FOOD

- ❒ F2005 A Lot on the Line
- ❒ F2007 The Amazing World of Microorganisms
- ❒ F2008 A Recipe for Food Safety Success
- ❒ F2009 Basic Personnel Practices
- ❒ F2010 Close Encounters of the Bird Kind
- ❒ F2011 Available Post Harvest Processing Technologies for Oysters
- ❒ F2013 Control of *Listeria monocytogenes* in Small Meat and Poultry Establishments
- ❒ F2014 Controlling Food Allergens in the Plant
- ❒ F2015 Controlling *Listeria*: A Team Approach
- ❒ F2016 Bloodborne Pathogens: What Employees Must Know
- ❒ F2020 Egg Handling and Safety
- ❒ F2021 Egg Production
- ❒ F2030 "Egg Games" Foodservice Egg Handling & Safety
- ❒ F2035 Fabrication and Curing of Meat and Poultry Products
- ❒ F2036 Emerging Pathogens and Grinding and Cooking Comminuted Beef
- ❒ F2037 Cooking and Cooling of Meat and Poultry Products
- ❒ F2039 Food for Thought – The GMP Quiz Show
- ❒ F2040 Food Irradiation
- ❒ F2045 Food Microbiological Control
- ❒ F2050 Food Safe-Food Smart – HACCP and Its Application to the Food Industry (Part 1 & 2)
- ❒ F2060 Food Safe Series I (4 videos)
- ❒ F2070 Food Safe Series II (4 videos)
- ❒ F2080 Food Safe Series III (4 videos)
- ❒ F2081 Food Safety Begins on the Farm
- ❒ F2090 Food Safety: An Educational Video for Institutional Food Service Workers
- Food Safety for Food Service Series I
- ❒ F2095 Now You're Cooking
- ❒ F2100 Tape 1 – Food Safety for Food Service: Cross Contamination
- ❒ F2102 Tape 2 – Food Safety for Food Service: Personal Hygiene
- Food Safety for Food Service Series II
- ❒ F2104 Tape 1 – Basic Microbiology and Foodborne Illness
- ❒ F2105 Tape 2 – Handling Knives, Cuts, and Burns
- ❒ F2106 Tape 3 – Working Safely to Prevent Injury
- ❒ F2107 Tape 4 – Sanitation
- ❒ F2110 Food Safety is No Mystery
- ❒ F2111 Controlling *Salmonella*: Strategies That Work
- ❒ F2120 Food Safety: For Goodness Sake Keep Food Safe
- ❒ F2121 Food Safety the HACCP Way
- Food Safety Zone Video Series
- ❒ F2125 Tape 1 – Food Safety Zone: Basic Microbiology
- ❒ F2126 Tape 2 – Food Safety Zone: Cross Contamination
- ❒ F2127 Tape 3 – Food Safety Zone: Personal Hygiene
- ❒ F2128 Tape 4 – Food Safety Zone: Sanitation
- ❒ F2129 Food Technology: Irradiation
- ❒ F2130 Food Safety: You Make the Difference
- ❒ F2131 Fruits, Vegetables, and Food Safety: Health and Hygiene on the Farm
- ❒ F2133 Food Safety First
- ❒ F2134 Food Safety: Fish and Shellfish Safety
- ❒ F2135 Get with a Safe Food Attitude
- ❒ F2136 GLP Basics: Safety in the Food Micro Lab
- ❒ F2137 GMP Basics: Avoiding Microbial Cross-Contamination
- ❒ F2140 GMP Basics: Employee Hygiene Practices
- ❒ F2143 GMP Basics: Guidelines for Maintenance Personnel
- ❒ F2147 GMP Basics: Process Control Practices
- ❒ F2148 GMP – GSP Employee
- ❒ F2150 GMP: Personal Hygiene and Practices in Food Manufacturing
- GMP Food Safety Video Series
- ❒ F2151 Tape 1 – Definitions
- ❒ F2152 Tape 2 – Personnel and Personnel Facilities
- ❒ F2153 Tape 3 – Building and Facilities
- ❒ F2154 Tape 4 – Equipment and Utensils
- ❒ F2155 Tape 5 – Production and Process Controls
- ❒ F2160 GMP: Sources and Control of Contamination during Processing
- GMPs for Food-Plant Employees: Five-volume Video Series Based on European Standards and Regulations
- ❒ F2161 Tape 1 – Definitions
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- ❒ F2164 Tape 4 – Equipment and Utensils
- ❒ F2165 Tape 5 – Production/Process Controls
- ❒ F2169 HACCP: Training for Employees – USDA Awareness
- ❒ F2170 The Heart of HACCP
- ❒ F2171 HACCP: The Way to Food Safety
- ❒ F2172 HACCP: Training for Managers
- ❒ F2173 Inside HACCP: Principles, Practices and Results
- ❒ F2175 Inspecting for Food Safety – Kentucky's Food Code
- ❒ F2180 HACCP: Safe Food Handling Techniques
- ❒ F2190 Is What You Order What You Get? Seafood Integrity
- ❒ F2191 Microbial Food Safety: Awareness to Action
- ❒ F2210 Northern Delight – From Canada to the World
- ❒ F2220 Proper Handling of Peracidic Acid
- ❒ F2230 Purely Coincidental
- ❒ F2240 On the Front Line
- ❒ F2250 On the Line
- ❒ F2260 100 Degrees of Doom... The Time and Temperature Caper
- ❒ F2265 A Day in the Deli: Service, Selection, and Good Safety
- ❒ F2266 HACCP: A Basic Understanding
- ❒ F2270 Pest Control in Seafood Processing Plants
- ❒ F2271 Preventing Foodborne Illness
- ❒ F2280 Principles of Warehouse Sanitation
- ❒ F2290 Product Safety and Shelf Life
- ❒ F2310 Safe Food: You Can Make a Difference
- ❒ F2320 Safe Handwashing
- ❒ F2321 All Hands on Deck
- ❒ F2322 The Why, The When, and The How Video
- ❒ F2325 Safe Practices for Sausage Production
- ❒ F2330 Sanitation for Seafood Processing Personnel
- ❒ F2340 Sanitizing for Safety
- ❒ F2341 Science and Our Food Supply
- ❒ F2342 Seafood HACCP Alliance Internet Training Course
- ❒ F2350 ServSafe Steps to Food Safety
- ❒ F2350–1 Step One: Starting Out with Food Safety
- ❒ F2350–2 Step Two: Ensuring Proper Personal Hygiene
- ❒ F2350–3 Step Three: Purchasing, Receiving and Storage
- ❒ F2350–4 Step Four: Preparing, Cooking and Serving
- ❒ F2350–5 Step Five: Cleaning and Sanitizing
- ❒ F2350–6 Step Six: Take the Food Safety Challenge: Good Practices, Bad Practices – You Make the Call
- ❒ F2370 Supermarket Sanitation Program – Cleaning and Sanitizing
- ❒ F2380 Supermarket Sanitation Program: Food Safety
- ❒ F2390 Take Aim at Sanitation
- ❒ F2391 Understanding Foodborne Pathogens
- ❒ F2410 Wide World of Food Service: Brushes
- ❒ F2420 Your Health in Our Hands, Our Health in Yours
- ❒ F2430 Smart Sanitation: Principles and Practices for Effectively Cleaning Your Food Plant
- ❒ F2440 Cleaning and Sanitizing in Vegetable Processing Plants: Do It Well; Do It Safely!
- ❒ F2450 A Guide to Making Safe Smoked Fish
- ❒ F2451 A HACCP-based Plan Ensuring Food Safety in Retail Establishments
- ❒ F2460 Safer Processing of Sprouts
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THOUGHTS
ON TODAY'S FOOD SAFETY...

Put Me Out of Business, Please

William D. Marler
Marler Clark, LLP, PS
Seattle, Washington

Almost 10 years ago, sometime in early October, 1996, 16-month-old Anna Gimmestad of Denver, Colorado had a glass of apple juice manufactured by Odwalla Inc. of Half Moon Bay, California. Anna was admitted to Denver Children's Hospital on October 16 after her parents discovered she had bloody diarrhea. She developed hemolytic uremic syndrome (HUS), which resulted in severe kidney damage. During the course of the next few weeks, Anna's heart stopped several times. On November 8, 1996, Anna went into cardiac and respiratory arrest and died.

The juice that killed Anna and sickened at least 70 others was contaminated with *E. coli* O157:H7. Marler Clark represented most of the seriously-effected survivors of the outbreak, including three other children who developed hemolytic uremic syndrome and suffered permanent kidney damage. Documents obtained during litigation revealed Odwalla's decision to continue to produce unpasteurized juices despite known contamination. Odwalla eventually paid multi-million dollar settlement to the victims and their families and pleaded guilty to criminal charges of selling tainted apple juice. The Food and Drug Administration assessed a $1.5 million fine – the largest ever assessed in a food industry case.

The Odwalla outbreak led FDA and others to focus on fresh fruits and vegetables as a significant source of foodborne illness, including the publication of guidance for industry in 1998.

Once again, FDA has this year issued guidelines for the safe production of fresh-cut fruits and vegetables. The industry has responded with renewed press releases citing commitments to food safety. We've been here before.

The latest stern warning from FDA seems to have been prompted by the August 2005 outbreak of *E. coli* O157:H7 infections of some thirty people, including children, who ate Dole bagged, pre-washed lettuce. At least 245,000 bags of lettuce were recalled across the country. In that outbreak alone, eight were hospitalized, and one child developed acute kidney failure, all from eating bagged, pre-washed lettuce.

In 2004 FDA sent a letter to the lettuce and tomato industry to "make them aware of [FDA's] concerns regarding continuing outbreaks and to encourage the industries to review their practices." All of these concerns by FDA were prompted by some 55 outbreaks tied to fresh fruits and vegetables between 1990 and 1998.

There have been more. A few examples:

- In 2004, 13 residents of a California retirement center were sickened and two died after eating *E. coli*-contaminated pre-washed spinach.
- In September 2003, nearly 40 patrons of a California restaurant chain became ill after eating salads prepared with bagged, pre-washed lettuce. Dozens were hospitalized and several developed life-threatening kidney failure.
- In July 2002, over fifty young women were stricken with *E. coli* at a dance camp after eating pre-washed lettuce, leaving several hospitalized, and one with life-long kidney damage.

Following these produce-related outbreaks, FDA issued a stern warning to the industry "to reiterate our concerns and to strongly encourage firms in your industry to review their current operations." In this letter, FDA cited research linking some or all of the outbreaks to sewage exposure, animal waste, and other contaminated water sources. Now in 2006, FDA asks the industry to address concerns about employee infectious disease as a possible contributing factor in these outbreaks.

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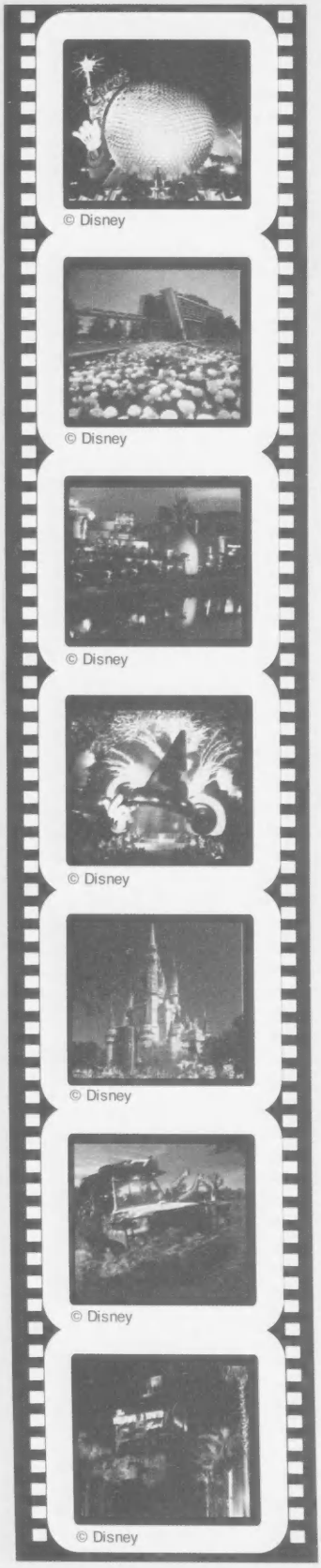

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